

Production of Natural Resources

Forest Products

Minerals

Forest Products

Introduction

Since the Chugach National Forest's creation in 1909, both commercial and personal use timber harvest has been a common activity. Specific areas of the Forest with road or water access were used for the harvesting of wood products. Commercial logging for railroad ties, mine props and construction materials dates back to the late 1800s. Much of this timber harvest occurred on the Kenai Peninsula, although some harvest occurred in Prince William Sound and Afognak Island before its selection and transfer under ANSCA primarily during the late 1960s and early 1970s (USDA Forest Service 1989b). Personal use harvesting of firewood, cabin logs, poles, Christmas trees, transplant trees and shrubs, and other forest products has remained small, but steady and, like commercial harvest, is generally limited to those areas that have road or water access. Despite the level of historical forest products harvesting over the last 90 years, most of the forested lands have never been cut and 99 percent of the Forest remains in an unroaded condition.

Legal and Administrative Framework

- The **National Forest Management Act (NFMA) of 1976** sets forth the requirements for Land and Resource Management Plans for the National Forest System. Regulations on land and resource management planning (36 CFR 219) require the identification of areas suitable and available for timber harvest and the allowable sale quantity (ASQ) from those lands. In addition, 36 CFR 219 requires the supply-and-demand situation for resource commodities to be analyzed.

Key Indicators

The following are key indicators for Forest Products:

Suitable Timberlands Scheduled for Chargeable Timber Harvest

- Estimated average annual demand for commercial forest products
- Acres of suitable timberlands allocated for timber production by prescription category and management area prescription
- Annual allowable sale quantity from suitable timberlands (chargeable board/cubic foot volume of sawtimber and utility volume)

Unsuitable Forestland Planned for Nonchargeable Timber Harvest

- Estimated average annual demand for personal and free use forest products
- Annual acres of unsuitable forestland planned for vegetation management by small commercial, personal and /or free use timber harvest

- Annual total board/cubic foot volume of nonchargeable forest products (sawtimber, poles, cabin logs, firewood) available for small commercial, personal, and/or free use

Resource Protection Measures

Mitigation measures to reduce or prevent significant effects of timber management on other resources are outlined in the Revised Forest Plan standards and guidelines for timber and other resource activities.

Affected Environment

Forest Land Base

Forested lands occupy slightly less than 1.2 million acres or about 23 percent of the Chugach National Forest. The remaining 77 percent is non-forested types such as water, ice, rock, muskeg, and alpine vegetation. The forested lands vary from sparse muskeg to heavily timbered stands.

The forests of the Chugach Forest are primarily the western hemlock-Sitka spruce forest type accounting for 84 percent of the forested land base. This type is a segment of the temperate rain forest that occupies a coastal strip 2,000 miles long from northern California to Southcentral Alaska. The remaining 15 percent of forested lands support cottonwood, white spruce, aspen, paper birch, and Alaska yellow-cedar forest types.

Current Condition of the Forest Land Base

About 27 percent of the forestlands or 319,000 acres of the Chugach forests are "Timberlands." Timberlands are forests biologically capable of producing industrial wood products. Previously these lands were called commercial forestlands and are often called "productive" forestlands. In addition to timberlands, there are about 877,000 acres (73 percent), which are classified as "Other Forest Land." These lands are not capable of producing industrial forest products, but are of major importance for watershed protection, wildlife habitat, recreation and other uses. Other forestlands are incapable of yielding crops of industrial wood usually because of adverse site conditions. These conditions include sterile or poorly drained soil, sub alpine conditions, and steep rocky areas where topographic conditions are likely to prevent management for timber production. Other forestland has been called noncommercial or "unproductive" forestland.

History of Land Selections and Legislative Withdrawals

National legislation has reduced the available timberlands of the Chugach Forest. About 103,000 acres have either been selected by the state or Native corporations or legislatively withdrawn. These lands contain about 37,000 acres of timberland that are no longer available for timber harvest considerations.

These legislation acts includes:

- **The Alaska Statehood Act of 1958.** This act authorized the selection of up to 400,000 acres from the Chugach and Tongass national forests in Alaska for the development and expansion of Alaska communities. About 390,000 acres of the state selections on the Chugach National Forest are timberlands.
- **The Alaska Native Claims Settlement Act of 1971 (ANSCA).** ANSCA authorized the transfer of about 44 million acres throughout the State of Alaska from federal management to private ownership. Under ANSCA, Native regional and village corporations were given the opportunity to select from National Forest System lands. Approximately 417,000 acres have been selected to date.
- **The Alaska National Interest Lands Conservation Act of 1980 (ANILCA).** ANILCA transferred about 1,581,000 million acres of public domain to the Chugach, which have not been inventoried yet, however the additions are estimated to have little commercial timber value.

As a result of the above legislation, there are approximately 1,093,000 acres of available forestland on the Chugach. Available timberlands amount to 379,850 acres.

Tentatively Suitable Forest Lands

Not all of the remaining available timberland on the Chugach is suitable for timber harvest. The NFMA requires the Secretary of Agriculture to identify lands not suited for timber production due to physical limitations and other pertinent factors. The NFMA also included consideration of economic factors as a requirement in the identification of suitable lands.

A timber resource land suitability analysis has been completed for the Forest Plan revision (FEIS, Appendix B). Tentatively suitable lands have the biological capability, and availability, to produce commercial wood products. To be considered tentatively suitable, the forested land must:

- be at least 10 percent occupied by trees or have formerly had such tree cover, and not be developed for non-forest uses;
- be capable of harvest with available technology to ensure timber production without irreversible resource damage to soil productivity or watershed conditions;
- be capable of being restocked within five years after final harvest; and,
- not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

Based upon the tentatively suitable analysis, there are 282,610 acres of timberland available for timber harvest on the Chugach National Forest.

Current Condition of the Timber Resource

There are eleven forest types within the Chugach (Table 3-78). The western hemlock, mountain hemlock, Sitka spruce, and hemlock-Sitka spruce forest types account for about 84 percent of the total forested land area. These types in addition to black cottonwood are found in all three geographic areas of the Chugach (Kenai Peninsula, Prince William Sound, and Copper River Delta).

The white spruce, black spruce and birch forest types are found almost exclusively on the Kenai Peninsula portion of the Forest. The white spruce type has experienced significant mortality since the early 1980s from a spruce bark beetle epidemic that has encompassed most of the Kenai Peninsula and Southcentral Alaska.

Table 3-78: Forest type composition (percentage) on forested lands on the Chugach National Forest.

Forest Type	Timberlands		Other Forest Lands		Total Forest
	Available	Reserved	Available	Reserved	
Unclassified	0.0	0.0	7.5	0.0	7.5
Black Spruce	0.0	0.0	0.1	0.0	0.1
White Spruce	2.6	0.0	0.7	0.0	3.2
Hemlock-Spruce	4.5	2.2	4.0	0.0	10.8
Sitka Spruce	7.2	0.4	12.9	0.0	20.5
Mountain Hemlock	5.3	0.6	27.5	9.6	43.0
Western Hemlock	8.6	0.4	0.4	0.0	9.4
Alaska Cedar	0.0	0.0	1.6	0.0	1.6
Other Nonstocked	0.0	0.0	0.0	1.6	1.6
Black Cottonwood	1.0	0.1	0.1	0.0	1.2
Birch	1.0	0.0	0.0	0.0	1.1
Total	30.3	3.6	54.9	11.1	100.0

Source: Forest Resources of Prince William Sound and Afognak Island, Alaska: Their Character and Ownership, 1978, PNW-RB-163 and Timberland Resources of the Kenai Peninsula, Alaska, 1987, PNW-RB-180.

Age Class Distribution

As shown in Table 3-79, the Chugach National Forest is a mix of old-growth stands, naturally regenerated forest, and planted forest. Harvest-created young-growth amounts to less than one percent of the total timberlands. Timberlands are classified into five stand conditions: (1) old-growth sawtimber, (2) young-growth sawtimber, (3) poletimber, (4) seedling and sapling, and (5) nonstocked. For timber inventory purposes, stands of trees 150 years old or older are designated as old-growth. Nearly 66 percent of timberlands meet the criteria for old-growth sawtimber while 92 percent is sawtimber. Timberlands greater than 150 years of age cover 66 percent (186,523 acres) of the 282,610 acres in the tentatively suitable land base.

Table 3-79: Estimated age class distribution (M acres) on the Chugach National Forest.

Age Class (Years)	All Timberlands	Tentatively Suitable Timberlands
0-5	3,195	2,826
5-40	12,779	11,304
40-70	12,779	11,304
70-150	79,867	70,653
150+	210,859	186,523
Total	319,470	282,610

Source: Forest Resources of Prince William Sound and Afognak Island, Alaska: Their Character and Ownership, 1978, PNW-RB-163 and Timberland Resources of the Kenai Peninsula, Alaska, 1987, PNW-RB-180.

Note: Data from the above inventories has been adjusted for land ownership changes since the inventories.

Timber Inventory Methodology and Scientific Accuracy

In 1978, an extensive point sampling system inventory was completed for the Chugach National Forest. The 1978 inventory was designed to achieve an estimate of the standing volume on the Forest within certain error limitations. Sampling errors of the area and volume, which resulted, met the requirements of FSM 2409.13 (Plus or minus 10 percent per billion net cubic feet at a 68 percent confidence interval) and are displayed in Table 3-80.

Table 3-80: Relative sampling errors at the 68 percent confidence level (percent).

	Design Sampling Error	Sampling Error Achieved
Prince William Sound and Copper River 1978 Inventory		
Net Growing Stock Volume on Available Timberland \1 Per Billion cubic feet	10.0	10.5
Net Growth of Growing Stock on Available Timberlands \1 Per Billion cubic feet	10.0	2.6
Kenai Peninsula 1987 Inventory		
Net Growing Stock Volume on Available Timberland \2 Per Billion cubic feet	10.0	9.2
Net Growth of Growing Stock on Available Timberlands \2 Per Billion cubic feet	10.0	1.7

\1 - Source: Forest Resources of Prince William Sound and Afognak Island, Alaska: Their Character and Ownership, 1978, PNW-RB-163.

\2 - Source: Timberland Resources of the Kenai Peninsula, Alaska, 1987, PNW-RB-180.

In 1987, a timber resource inventory of the Kenai Peninsula was completed for all landowners. For the Forest Plan revision, the 1987 Kenai timber inventory was used to update the Kenai Block of the 1978 inventory. Collectively, these inventories were not designed to collect all timber resource information nor were they designed for comparison of individual plot results to the Forest's Land and Vegetation Cover Type maps (also known as timber type maps) polygons or volume strata.

The results of 1978 Forestwide and 1987 Kenai Peninsula inventories (Table 3-81) show that the Chugach National Forest had a net growing stock of 1.544 billion cubic feet on available timberlands (4.1 thousand cubic feet per acre). This would indicate that the 282,610 acres of tentatively suitable land would have

approximately 1.163 billion cubic feet of growing stock. The net growing stock for productive forestland or all timberlands was 1.755 billion cubic feet or 4.2 thousand cubic feet per acre.

Table 3-81: Net volume of growing stock on forested lands on the Chugach National Forest.

Revision Forest Inventory All Inventory Blocks Combined	National Forest Sum	Net Volume of Growing Stock Cubic Feet Sum	Net Volume of Sawtimber Board Feet Sum
Land Classification	Acres	CF	BF (11/4)
Timberland, Available (Unreserved)	375,385	1,544,348,619	7,388,164,044
Timberland, Reserved	45,238	211,073,740	1,065,259,167
Total Timberland	420,623	1,755,422,359	8,453,423,211
Other Forest Land, Unreserved	680,929	388,031,966	1,539,874,254
Other Forest Land, Reserved	138,173	76,522,516	313,337,990
Total Other Forest Land	819,102	464,554,482	1,853,212,244
Total Forest, Unreserved	1,056,314	1,932,380,585	8,928,038,298
Total Forest, Reserved	183,411	287,596,257	1,378,597,157
Total Forest	1,239,725	2,219,976,841	10,306,635,455

Source: Forest Resources of Prince William Sound and Afognak Island, Alaska: Their Character and Ownership, 1978, PNW-RB-63 and Timberland Resources of the Kenai Peninsula, Alaska, 1987, PNW-RB-180.

Table 3-82 shows the net annual growth on available timberlands on the Forest. The total net annual volume growth on the Forest's growing stock is 9.3 million cubic feet per year while the net annual growth of the Forest's sawtimber is 29.3 million board feet per year.



Table 3-82: Net annual growth of growing stock on available timberlands on the Chugach National Forest (Forestwide summary).

Forest Type	National Forest Available Timberland	Net Annual Growth Of Growing Stock	Net Annual Growth Of Sawtimber
Conifer	Acres	Cubic Feet (CF)	Board Feet BF (11/4)
Black Spruce	0	0	0
Western Hemlock	106,720	2,736,064	9,000,563
Mountain Hemlock	65,619	553,690	106,720
Hemlock-Spruce	56,378	3,630,848	9,833,188
Sitka Spruce	89,578	2,528,038	10,722,592
White Spruce	31,750	(226,035)	296,814
Total Conifer	350,045	9,222,606	29,959,876
Hardwood			
Black Cottonwood	12,319	110,740	365,925
Paper Birch	12,974	(22,163)	(996,216)
Quaking Aspen	0	0	0
Total Hardwood	25,293	88,577	(630,292)
Nonstocked	48	301	1,873
Total	375,385	9,311,484	29,331,458

Source: Forest Resources of Prince William Sound and Afognak Island, Alaska: Their Character and Ownership, 1978,PNW-RB-163 and
Timberland Resources of the Kenai Peninsula, Alaska, 1987,PNW-RB-180.

Current Practices

Regeneration Methods

Historically, clearcutting, with reliance on natural seeding, has been the most commonly used silvicultural system in the western hemlock-Sitka spruce forest type found in Prince William Sound and Copper River watersheds. Clearcutting is used where timber production is the primary use and where it is the optimal method. The clearcutting method is favored for the following reasons: (1) clearcutting increases exposure to the sun, which raises soil temperature, speeds up organic decomposition, and thus improves soil productivity; (2) the regeneration of Sitka spruce is favored in open sites with disturbed soils, (3) clearcutting aids in controlling dwarf mistletoe by eliminating infected overstory trees, (4) minimizes windthrow and logging damage, (5) logging costs are lower than with other systems. The clearcut method has proven very successful in the regeneration of healthy forested stands.

However, the practice of clearcutting has been, and continues to be, a controversial issue. The main concerns center around the esthetics of clearcuts, and the loss of old-growth forest stands and their attendant wildlife resources. The Alaska Region has been using alternative silvicultural methods other than standard clearcut harvesting. These methods involve both the harvest of trees singly or in small groups (typically called uneven-aged management), leaving residual trees in clearcuts, and extending the "rotation age" of harvesting – the

time period at which a previously harvested area or stand can be harvested again. These various options are briefly described (see also the Revised Forest Plan, Forestwide standards and guidelines).

Uneven-aged Systems. This is typically the harvesting of single trees from within a stand, or of small groups of trees (usually less than two acres). This method maintains a multi-aged, multi-layered stand structure by removing some trees in all age groups. Very little is known about the ultimate success of uneven-aged methods in Southeast and Southcentral Alaska.

Two-aged Systems. In this system, approximately 10-20 percent of a stand is left as residual (or reserve) trees, both individually and in patches, and the rest of the stand is harvested. The reserve trees and patches remain unharvested, and provide structural diversity and an older aggregation of trees within the otherwise young-growth stand.

Extended Rotations. In the coastal forests of Prince William Sound and Copper River, old-growth forest conditions are normally not reached until a stand is 150 years old or older. Extending the time period before a young-growth stand is scheduled for a second harvest gives the stand more time to acquire at least some of the characteristics of old-growth forests. Extended rotations also mean either fewer entries into a given area within a given time period or a smaller amount of harvest when entries are made, but can increase the need for roads if equivalent volumes are to be harvested. Currently, young-growth is projected to be harvested on an average 160-year rotation cycle in both these areas under management area prescriptions specifying a normal rotation and a 200-year rotation cycle under management area prescriptions specifying an extended rotation. Due to less productive sites on the Kenai Peninsula, the normal rotation cycle is 200 years and 250 years in management area prescriptions specifying an extended rotation.

Young-Growth Management

After harvest, young-growth stands can be treated through thinning and other methods to promote growth and tree quality. In the recent years, such timber stand “improvements” have typically consisted of pre-commercial thinning and have averaged 136 acres per year.

Yarding Methods

In the last twenty years almost all timber harvest on the Forest has been confined to the Kenai Peninsula where tractor yarding is used to move logs to landings for loading and transport via trucks.

Chugach Timber Program

Figure 3-74 combines fragmented records for annual timber harvest during the period 1909 to 1979 with available removal records for the 1980 to 1999 period.

As displayed in Figure 3-74, the average amount of timber cut and removed from the Chugach Forest over the last 90 years is 3.8 million board feet per year. Annual harvest volumes ranged from a low of 0.4 million board feet in 1999 to a high of 11.7 million board feet around 1910 with a marked decrease associated with the Great Depression of the 1930s. Figure 3-74 also displays the annual average harvest rate over the last 20 years (1980-1999), which has declined to 1.8 million board feet per year. The down sloping regression trend line for the 90 year period indicates that the average annual harvest rate has been steadily declining despite cyclical bursts above the 90 year average. The past five years (1996-2000), the average annual harvest was 1.5 MMBF.

Figure 3-74: Historical timber harvest on the Chugach National Forest 1909-1999.

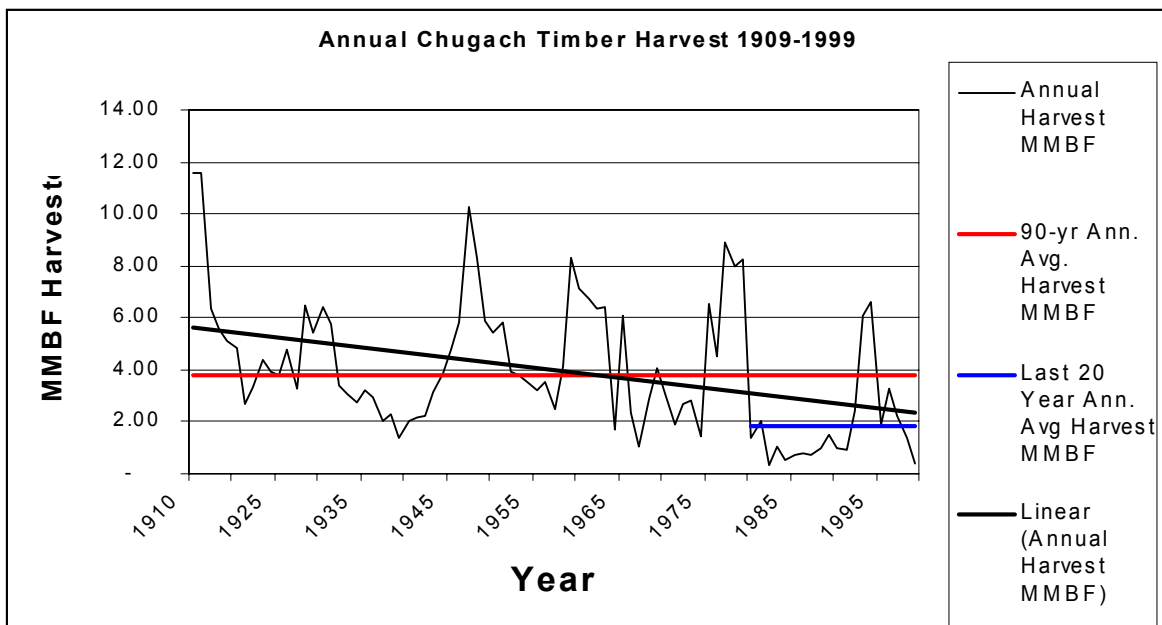


Figure 3-75 displays timber harvest on the Forest over the same 90-year period on a decadal basis. The average rate of timber harvest per decade has been 33.8 MMBF per decade.

Figure 3-75: Historical timber harvest on the Chugach National Forest, 1909-1999, by decade.

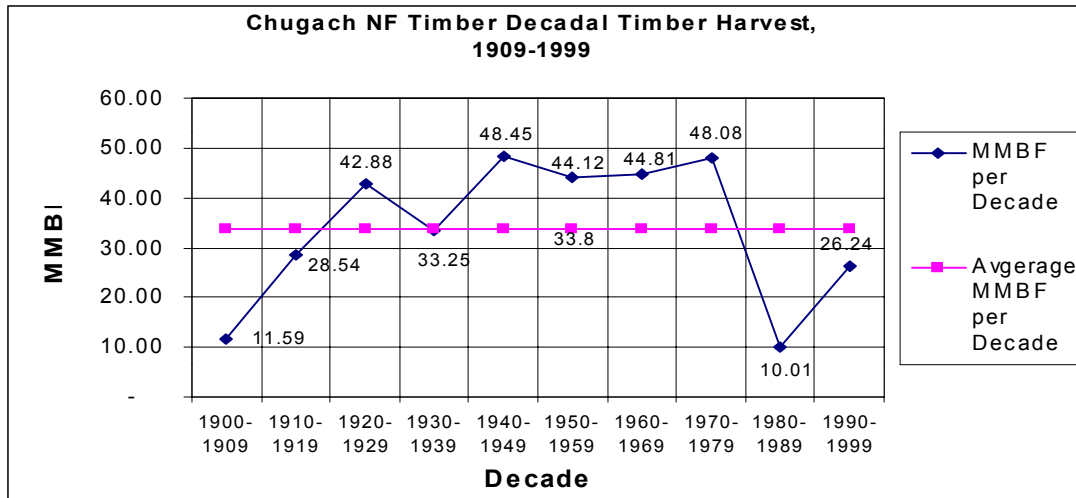


Table 3-83 displays the annual combined offer, sold, and harvest of net saw logs and utility logs between 1980 and 1999 for the commercial program. Since 1980, the Forest has offered for sale an average of 8.1 million board feet of timber annually. Approximately 31 percent (2.5 million board feet) of the annual average offer was actually sold while 22 percent (1.8 million board feet) was actually harvested. Personal use permits have ranged from 100,000 to 500,000 board feet per year over the past 13 years. Free use permits between 1994 and 1997 averaged 555,000 board feet per year with an additional estimated volume of 50,000-100,000 board feet of dead and down timber for which no permit is needed.

Under the 1984 Forest Plan (1985-1999), the average annual sale offering decreased to 3.5 million board feet, however the annual average volume sold increased to 3.0 million board feet and the annual average volume harvested increased to 2.0 million board feet. With the exception of the Montague Island Chugach Alaska road right-of-way volume and some minor personal use sale volume on the Cordova Ranger District, all timber harvest on the Forest since 1985 has been limited to the Kenai Peninsula.

Table 3-83: Timber sale volume offered, sold, and harvested, 1980-1999.

Volume in MMBF			
FISCAL YEAR	OFFER CNF TOTAL SAW+UTIL	SOLD CNF TOTAL SAW+UTIL	HARVESTED CNF TOTAL SAW+UTIL
1980	40.8	0.2	1.3
1981	16.6	1.0	1.8
1982	39.6	0.7	0.4
1983	10.2	0.8	1.1
1984	2.0	1.8	0.5
1985	2.0	0.1	0.7
1986	2.0	0.8	0.8
1987	3.1	1.5	0.7
1988	2.0	0.8	1.0
1989	1.1	3.3	1.5
1990	4.0	4.2	0.5
1991	7.1	1.3	0.9
1992	5.0	2.3	2.4
1993	2.8	11.8	6.1
1994	1.2	2.8	6.6
1995	5.6	3.6	1.9
1996	2.1	2.7	3.3
1997	14.5	9.5	2.2
1998	0.1	0.2	1.4
1999	0.5	0.2	0.4
20 Year Total	162.3	49.6	35.4
Annual Average	8.1	2.5	1.8
% of Total Offer	100.0%	30.6%	21.8%

Source: R10-Regional Office, Forest Management, 1999.

Definitions:

OFFER - Volume offered for sale from normal timber sale contracts made to independent timber sale purchasers.

SOLD - Offered Volume that Sold in normal timber sale contracts made to independent timber sale purchasers.

HARVESTED - Sold Volume that was harvested in normal timber sale contracts made to independent timber sale purchasers.

SAW - Saw log - Volume from logs that are suitable in size and quality for the production of dimension lumber.

UTIL - Utility - Volume from logs that do not meet minimum requirements for sawtimber but are suitable for the production of usable chips.

Declining sale volumes have occurred throughout the Alaska Region, including the Chugach National Forest. Between 1980 and 1999, harvest volume peaked in 1994 at 6.6 million board feet (spruce beetle salvage on the Kenai Peninsula) and has since declined to 400,000 board feet in 1999. While the Forest's volume varies annually, its share of the regional sale volume has remained a consistent 1-3 percent of the regional total. Although the Forest's volumes are minor relative to regional and state sale levels, local purchasers consider it to be important because of the unique market it has served.

Uncut volume under contract is declining on the Forest, as it is throughout the region. As of December 31, 2001, the Forest has five remaining salvage timber sales with a total uncut volume of 1.2 million board feet (Table 3-84).

Table 3-84: Uncut timber volume under contract.

Sale Name	Remaining Uncut Volume (MBF ¹)	Remaining Value (\$)
Frenchy Creek Salvage	864	\$25,243
Alder Creek Salvage	137	2,680
Lv Ray Salvage	68	1,917
Granite Creek Decks	54	1,070
Trail River Decks #1	86	2,851
Total Sales	1,209	\$33,761

¹ MBF – thousand board feet

On the Kenai Peninsula, salvage harvesting of spruce bark beetle infested or killed white (Lutz) spruce has been the most commonly used silvicultural system, with a reliance on natural seeding on about 22 percent and planting on 78 percent of the average 227 acres harvested annually (1985-1997). Between 1974 to 1999, 2,545 acres have been harvested with commercial timber sales, 16 acres harvested in firewood fee areas, 189 acres harvested for fuel reduction, 362 acres harvested for personal use, and 44 acres harvested by the Forest Service. During the same period, pre-commercial thinning has occurred on 215 acres. The total area of timber removal by harvest during this period was 3,371 acres compared to 4,276 acres of prescribed burns.

The total acres treated by timber harvest and thinning from 1974 to 1999 account for less than 0.3 percent of all forested lands.

Timber Supply and Demand

Commercial Program

The primary sources of commercial quantities of timber within Southcentral Alaska are private corporations (principally Native corporations formed through the Alaska Native Claims Settlement Act), the State of Alaska, the Kenai Peninsula Borough, the Mat-Su Borough, private landowners, and the Chugach National Forest. Between 1986 and 1996, timber harvest volume from the Forest amounted to 1.48 percent (20.9 million board feet) of the total 1,408 million board feet harvested in Southcentral Alaska (Figure 3-76). Timber harvested from Forest lands is required to be processed, while other timber can be exported before processing.

Figures 3-77 and 3-78 indicate that most of the Chugach National Forest harvest volume during this period was low value utility volume (spruce beetle killed timber from the Kenai Peninsula) rather than higher value saw log volume. The percent of total saw log and utility volume in the Southcentral Alaska harvest during the 1986-1996 period is 0.8 and 20.7, respectively.

Figure 3-76: Southcentral Alaska timber harvest by ownership, 1986-1996.

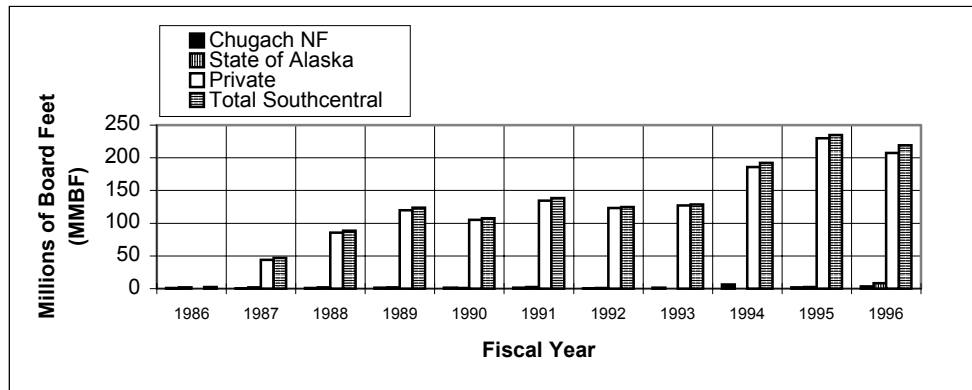


Figure 3-77: Sawlog harvest volume.

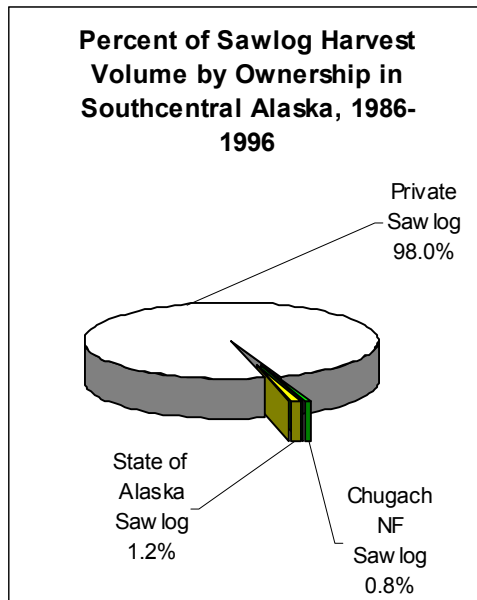
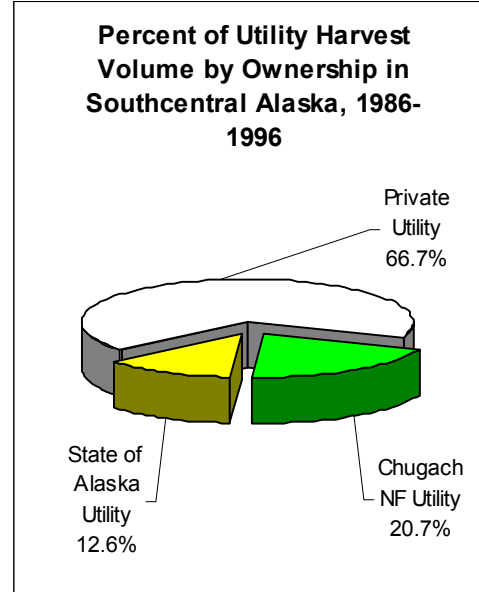


Figure 3-78: Utility harvest volume.



The commercial timber demand assessment for the Forest was derived from a 1997 study on the Tongass National Forest. In the study, Brooks and Haynes (1997) concluded that derived demand for national forest timber in Alaska is projected to range from 132 to 223 million board feet in the next decade (2001-2010). While the study was done for the Tongass Forest Plan revision, their analysis included saw log and utility volume from both the Tongass and Chugach National Forests.

The Chugach annual average timber harvest represents 0.8 percent of the Alaska Region's total, with the remainder from the Tongass. Derived demand for the Chugach was obtained by applying the Chugach annual harvest of 0.8 percent for the Alaska Region to Brooks and Haynes projected demand range of

132 to 223 million board feet over the next decade. This equates to a projected demand range for the Chugach National Forest ranging from 1.1 to 1.8 million board feet per year in the next decade (2001-2010) (Brooks and Haynes 1997). The upper demand projection of 1.8 million board feet per year is also the annual average timber harvest volume on the Chugach National Forest during the last 20 years (1980 to 1999)(see Table 3-20.6).

The Forest's lack of roads and other infrastructure makes many of its potential products inaccessible or economically infeasible (particularly during low to middle market cycles) to purchasers, processing facilities or personal use users. During the most recent high market cycle of the early 1990s, low value wood fiber from the Forest was harvested and processed for chips as far away as Ketchikan, by Louisiana Pacific prior to the shutdown of its mill in 1998 and in Homer, by Circle D-E. However, with the requirement for domestic processing of logs from national forest lands in Alaska, no major processing facilities in Southcentral Alaska, and high transportation costs to markets both inside and outside the state, it is highly probable that demand for commercial quantities of timber from the Chugach will continue to remain at low levels during the planning period.

Personal and Free Use Program

Future personal and free use demand is estimated to be 655 MBF board feet per year annually and is likely to increase over the years as local populations increase.

Special Forest Products

Special forest product markets include Christmas trees, transplant trees, conks, boughs, shrubs, forbs, etc. Demand for special forest products has historically been low with few permits issued annually. Demand is estimated to remain low. The one exception could be the commercial demand for shrubs and forbs for botanical uses. The Forest has received several requests for species information over the last several years; however, to date no commercial permits have been requested.

Environmental Consequences

General Effects

Timber may be cut and removed to contribute to the allowable sale quantity (ASQ) with the intent to create or improve stands that will meet future timber products needs. This includes live trees that meet the utilization standards on suitable lands, and dying trees, which at the time of the ASQ calculations was live volume.

Management area prescriptions that are suitable for timber harvest to meet timber goals and contribute to ASQ are 312 (Fish, Wildlife and Recreation), 314 (Forest Restoration), 321 (ANILCA 501(b)-3), and 411 (Resource Development). Timber harvest may be allowed under other management area prescriptions, but only to meet resource objectives. Harvest in these areas would not contribute to ASQ but would contribute toward the total timber sale program quantity.

Timber may be cut and removed to meet vegetation management objectives, such as hazard tree removal, fuel reduction, wildlife habitat maintenance and improvement, improvement of scenic vistas, and ecosystem management. In addition, timber affected by natural mortality events (fires, windstorms, insect and disease infestations) may be harvested under salvage sales to serve objectives other than commercial product offerings. Commercial products may be a byproduct of meeting these objectives. The nonchargeable volume (does not contribute to ASQ volume) of timber cut and removed to meet these objectives varies among alternatives based on objectives and available funding. Table 3-85 displays allowable sale quantity and timber sale program quantity at the full budget level for the first decade and chargeable and non-chargeable volume offered at the historic budget level for the first and fifth decades.

Timber harvesting could be done to accomplish biodiversity goals. If analyses indicate that current vegetation differs greatly from historical norms, vegetation manipulation, including timber cutting, may be used to try to emulate natural patterns of composition and structure. Timber products derived from this cutting could be sold commercially. Biodiversity accomplishments would be more pronounced in the No Action Alternative and Alternatives A and B, than in the Preferred Alternative and Alternatives C, D, E, and F.

As standards and guidelines are applied to projects, harvest volumes may be reduced based on site-specific situation and analysis. Examples are water quality guidelines, or wildlife and heritage resource protection measures could cause a reduction in volume harvested. Where possible, the effect of these standards and guidelines has been taken into account in the calculation of the ASQ. However, the ASQ is considered a ceiling, not a target, and certain conditions could arise in which standards and guidelines may limit the actual volume available.

Suitable Timber Lands

There are 282,610 acres of tentatively suitable lands, as defined by NFMA regulations (36 CFR 219.14(a)). This represents about 5.1 percent of the total Forest acreage and is the same for all alternatives. Appendix B of the FEIS contains a detailed discussion of the tentatively suitable determination process.

During the alternative development process, additional lands within the tentatively suitable timber base (282,610 acres) were determined to be inappropriate for timber production (36 CFR 219.14) in accordance with each alternative's objectives, and were classified as unsuitable.

The amounts of tentatively suitable land and lands designated as suitable for timber production, as well as the allowable sale quantity for each alternative are displayed in Table 3-85.

The acreage of suitable land on the Forest would vary from 0 percent in the Preferred Alternative and Alternatives C, D, E, and F to 1.1 percent in Alternative B, 7.4 percent in the No Action Alternative, and 2.7 percent in Alternative A. The average allowable sale quantity during the first decade from lands designated as

suitable for timber production ranges from a low of 0 MMCF (0 MMBF) in the Preferred Alternative and Alternatives C, D, E, and F to 12.9 MMCF (61.1 MMBF) in Alternative B, 16.0 MMCF (74.9 MMBF) in the Not Action Alternative, and 34.6 MMCF (162.9 MMBF) in Alternative A. (Reference FEIS, Appendix B, B-10-B-25 for a description of the timber resource analysis process, including the calculation of the allowable sale quantity and long-term sustained yield.)

Removing land from the suitable land base reduces both potential ASQ and long-term timber growth and yields. While the effect is not linear, the magnitude of the reduction is generally related to the proportion of lands removed. The timber production lost is irretrievable but is not irreversible. If future designation of these lands were changed to allow timber management, it would be possible to resume timber management activities.

Where land is dedicated to road construction or development of facilities, minerals or rock excavation, the loss of land for timber production is generally irretrievable and may be irreversible. Similarly, the occurrence of landslides or excessive erosion can significantly degrade soil productivity thus reducing the potential forest growth and yield.



Environment and Effects 3

Table 3-85: Land classification (acres) - tentatively suitable timberlands, suitable timberlands.

Timber Land Suitability Classification	No Action	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
Total National Forest (item 1 plus item 2)	5,491,580	5,491,580	5,491,580	5,491,580	5,491,580	5,491,580	5,491,580
1. Non-Forest Land (includes water)	4,295,540	4,295,540	4,295,540	4,295,540	4,295,540	4,295,540	4,295,540
2. Forest Land	1,196,040	1,196,040	1,196,040	1,196,040	1,196,040	1,196,040	1,196,040
3. Forest Land Withdrawn from Timber Production	103,250	103,250	103,250	103,250	103,250	103,250	103,250
4. Available Forest Land (item 2 minus item 3)	1,092,790	1,092,790	1,092,790	1,092,790	1,092,790	1,092,790	1,092,790
5. Non-productive Forests: Not capable of producing crops of industrial wood	712,940	712,940	712,940	712,940	712,940	712,940	712,940
6. Available Timberlands (PFL) (Item 4 minus item 5)	379,850	379,850	379,850	379,850	379,850	379,850	379,850
7. Timberlands Physically Unsuitable	74,630	74,630	74,630	74,630	74,630	74,630	74,630
8. Timberlands Inadequate Information	22,610	22,610	22,610	22,610	22,610	22,610	22,610
9. Tentatively Suitable Timberlands (Item 6 minus items 7 and 8)	282,610	282,610	282,610	282,610	282,610	282,610	282,610
Percent of Total Forest Lands Tentatively Suitable for Timber Production	23.60%	23.60%	23.60%	23.60%	23.60%	23.60%	23.60%
10. Tentatively suitable timberlands not appropriate for timber production:							
a. Resource protection (Forestwide standards and guidelines)	73,360	73,360	73,360	73,360	73,360	73,360	73,360
b. Pending withdrawal, productive Wilderness (Recommended or Study Area)	28,530	98,300	0	20,790	42,270	125,080	164,370
c. Pending withdrawal, productive Selected Lands (State or Native)	0	430	0	70	470	1,230	4,330
d. Not appropriate - RNAs	1,970	2,130	920	2,580	2,580	3,610	3,610
e. Not appropriate - Other Developed Visitor Facilities	0	1,210	0	0	0	300	0
f. Not appropriate - Dispersed Primitive Recreation	0	450	0	1,590	1,260	1,260	10,470
g. Not appropriate - Dispersed Backcountry Recreation	45,030	67,040	54,440	57,750	70,540	47,580	49,050
h. Not appropriate - Sensitive Animal	0	2170	530	1,480	1,480	3,260	0
i. Not appropriate - Fish & Wildlife Conservation Areas	54,810	28,310	3,140	63,540	78,530	22,080	9,110
j. Not appropriate - Mineral Claims	350	350	350	350	350	350	350
k. Not appropriate - Transportation/Utility/Electronic Site Corridors	730	520	730	730	730	730	730
l. Not appropriate - Special Alternative Management Direction	0	0	0	0	3,660	0	0
m. Not Appropriate - Economic feasibility	0	0	0	0	0	0	0
n. Unsuitable - Not needed to meet Alt. Mgmt. Objectives per CFR 219.14(c)(3)	0	8,340	0	0	7,380	3,770	650
Total (Items 10a through 10n)	204,810	282,610	133,470	222,240	282,610	282,610	282,610
11. Net Remaining Acres (Item 9 minus Item 10 a-n)	77,800	0	149,140	60,370	0	0	0

Environment and Effects 3

Table 3-85 (continued): Land classification (acres) - tentatively suitable timberlands, suitable timberlands.

Timber Land Suitability Classification	No Action	Preferred	Alt. A	Alt. B	Alt. C	Alt. D	Alt. E	Alt. F
12. Scheduled Suitable Forest Lands								
a. Scheduled with timber emphasis	0	0	38,280	3,130	0	0	0	0
b. Scheduled with fish, wildlife & recreation emphasis	77,800	0	110,860	57,240	0	0	0	0
Percent of total forest lands that are scheduled for timber production	6.5%	0.0%	12.5%	5.0%	0.0%	0.0%	0.0%	0.0%
Allowable Timber Harvest Acres (Annual) – Even-Aged Mgmt.	296	0	617	233	0	0	0	0
Allowable Timber Harvest Acres (Annual) – Un-even-Aged Mgmt.	74	0	154	58	0	0	0	0
Allowable Timber Harvest Acres (Annual) - Total	370	0	771	292	0	0	0	0
Allowable Timber Harvest Acres (1 st Decade)	3,697	0	7,714	2,917	0	0	0	0
Allowable Timber Harvest Acres (5 th Decade)	18,485	0	38,570	14,587	0	0	0	0
Allowable Sale Quantity – Cubic Feet (1 st Decade)								
Saw log (MMCF)	12.3	0.0	27.2	9.9	0.0	0.0	0.0	0.0
Utility (MMCF)	3.8	0.0	7.4	3.0	0.0	0.0	0.0	0.0
Total (MMCF)	16.0	0.0	34.6	12.9	0.0	0.0	0.0	0.0
Allowable Sale Quantity – Board Feet (1 st Decade)								
Saw log (MMBF)	57.9	0.0	128.7	47.4	0.0	0.0	0.0	0.0
Utility (MMBF)	17.0	0.0	34.2	13.7	0.0	0.0	0.0	0.0
Total (MMBF)	74.9	0.0	162.9	61.1	0.0	0.0	0.0	0.0

Timber Management Intensity

Suitable timberlands are allocated to three broad yield categories according to the intensity of timber management desired to meet management objectives for a particular alternative. Because each alternative has different resource objectives, the mixture of management intensities is also different for each.

Full timber yields. (Management Area Prescriptions 314 and 411) These lands generally have high timber yields. The full range of silvicultural practices is available subject to being consistent with the standards and guidelines designed to provide multiple uses. These lands are generally managed using even-aged silvicultural systems. Rotation ages for managed stands occur near the culmination of mean annual increment (CMAI), a point where the average net merchantable growth (cubic foot basis) is at its maximum level. The age at which this occurs is dependent on the species, utilization standards, site productivity, stocking, and the management applied to the stand. For the hemlock-Sitka spruce cover types found in Prince William Sound and Copper River, the CMAI and rotation age for the average stand is estimated to be 160 years. For the hemlock and white spruce cover types on the Kenai Peninsula, the CMAI and rotation age for the average stand is 200 years.

Modified timber yields. (Management Area Prescriptions 312 and 321) These lands have special requirements to meet other resource objectives that result in reduced yields, by extending the conversion period. Suitable lands in these management areas have extended rotation ages of 200 years for the hemlock-Sitka spruce cover types found in Prince William Sound and Copper River and 250 years for the hemlock and white spruce cover types on the Kenai Peninsula.

Table 3-86 displays the acres of suitable timberlands by management area prescription for each alternative. Alternatives A, No Action and B have the largest acreage of suitable timberlands. Alternatives C, D, D, E, F, and the Preferred Alternative have no suitable timberlands.

Table 3-86: Acres of suitable timberlands (STL) in management area prescription category and prescription by alternative.

Management Area Prescription Category/Prescription	Alternative						
	No Action	Preferred	A	B	C	D	E
Category 3 – 312	61,060	0	44,310	48,880	0	0	0
Category 3 – 314	0	0	12,540	3,130	0	0	0
Category 3 – 321	16,740	0	66,550	8,360	0	0	0
Total – Category 3	77,800	0	123,400	60,370	0	0	0
Category 4 – 411	0	0	25,740	0	0	0	0
Total – Category 4	77,800	0	149,140	60,370	0	0	0

Direct and Indirect Effects

General

The effects discussed below focus on acres actually harvested and the resulting forest products harvested from those areas. "Acres harvested" includes those acres in which trees were felled, yarded, and decked at landings.

Forest Products (Chargeable or ASQ) from Suitable Timberlands

Implementation of Alternative A would result in the most acres harvested and the greatest volume, followed by the No Action Alternative and B. Alternative A would harvest an average of 771 acres/year and would produce 16.3 million board feet/year (3.5 million cubic feet/year). The No Action Alternative would harvest 296 acres/year and produce 7.5 million board feet/year (1.6 million cubic feet/year). Alternative B would harvest 292 acres/year and produce 6.1 million board feet/year (1.3 million cubic feet/year). There would be no chargeable harvest effects in the Preferred Alternative and in Alternatives C, D, E and F. The chargeable volume in all three ASQ alternatives would be well above the projected annual demand of 1.1 to 1.8 million board feet per year.

Effects common to silvicultural harvest methods will be expected for the acres shown in Table 3-87 (see also FEIS, Appendix E). In all harvest alternatives, harvesting would be dominated by even-aged management system. Twenty percent of the acres harvested would be under an uneven-aged system. A primary objective when harvesting timber on suitable lands is to use silvicultural methods that favor and facilitate natural regeneration.

Table 3-87: Average acres per year harvested by silvicultural system - decade 1.

Silvicultural Systems	Alternative							
	No Action	Preferred	A	B	C	D	E	F
Even-Aged								
Clearcut	135	0	328	136	0	0	0	0
Seed Tree	0	0	0	0	0	0	0	0
Shelterwood	84	0	200	42	0	0	0	0
Coppice	0	0	0	0	0	0	0	0
Total Even-Aged	219	0	528	178	0	0	0	0
Uneven-aged								
Selection	0	0	0	0	0	0	0	0
Group Selection	74	0	154	58	0	0	0	0
Total Uneven-aged	74	0	154	58	0	0	0	0
Salvage	77	0	89	56	0	0	0	0
Sanitation	0	0	0	0	0	0	0	0
Total Salvage/Sanitation	77	0	89	56	0	0	0	0
Grand Total	370	0	771	292	0	0	0	0

A limited amount of thinning is planned for the three alternatives with an ASQ. Table 3-88 displays the estimated acres to be thinned by alternative. Some thinning is accomplished every year through the free and personal use forest

products program. Also, thinning may be prescribed where insect or disease damage is apparent in stand understories.

Table 3-88: Average acres per year of precommercial thinning - decade 1.

	Alternative							
	No Action	Preferred	A	B	C	D	E	F
Annual Pre-commercial Thinning	95	0	180	75	0	0	0	0

Forest Products (Nonchargeable) Timber Harvest on Unsuitable Forest Lands

In addition to commercial ASQ harvest in the No Action Alternative and Alternatives A, and B, vegetation management is planned on a portion of unsuitable forest lands in all alternatives to meet forest restoration, fuel reduction, wildlife habitat, insect and disease suppression, other resource objectives and to provide accessible forest products for the Forest's Alaska free use/personal use program. The acreage planned for treatment varies by alternative (see Table 2-11 in Chapter 2). The volume from this type of harvest is called "nonchargeable volume" because it was not included in the growth and yield projections to arrive at the ASQ.

Some of the planned treatments such as hazard tree removal in campgrounds, administrative sites, etc., would require tree removal that is expected to yield small annual quantities of nonchargeable sawtimber, cabin logs, fuel wood, posts, and poles. These nonchargeable forest product quantities would be available in a mix of sizes for commercial, Alaska free use and/or personal use, subject to demand, available access, and annual funding. In ASQ sale areas, some additional fuel wood would be available as a byproduct of those sales (this volume was not estimated).

Table 3-89 displays the decadal acres of vegetation management on unsuitable forestlands by alternative and the expected accessible non-chargeable timber volume that would be available for commercial, personal and free use.

Table 3-89: Acres of vegetation management on unsuitable timberlands with projected road accessible nonchargeable volume by alternative - decade 1.

Unsuitable Forest Land Timber Harvest	Alternative							
	No Action	Preferred	A	B	C	D	E	F
Unsuitable Forest Land (Acres)	6,010	3,750	7,590	7,120	4,260	3,550	2,600	2,350
Nonchargeable Harvest (MMCF)	0.63	4.3	7.3	6.3	4.3	3.1	2.5	2.3
Nonchargeable Harvest (MMBF)	22.1	15.1	27.1	25.1	17.1	10.0	8.0	7.0

The availability of non-chargeable volume for commercial, personal, and free use is expected to be highest in Alternative A, followed by, in decreasing order, B, No Action, C, Preferred, D, E, and F. Alternative F would provide the least available volume. However, all alternatives would meet the estimated average annual demand for personal and free use forest products of 0.655 million board feet.

Volumes above the average demand would be available for commercial use and would rank the same as for total volume.

Where fuel wood harvests are a byproduct of ASQ sales, no further ground disturbance activity is anticipated. Where volume is the product of vegetation management on unsuitable lands, some slash accumulation and ground disturbance is anticipated. Adherence to Forestwide standards and guidelines is expected to result in no adverse effects.

Special Forest Products

The gathering of special forest products for commercial and personal uses is allowed in most management area prescriptions and is expected to continue under all alternatives. Ground disturbance from these activities is expected to be minimal. Requests for commercial special forest products permits would continue to be evaluated on a case-by-case basis, subject to management area prescription restrictions.

Effects on forest products production from recreation management.

All alternatives involve some hazard tree removal or insect and disease suppression in and around campgrounds, recreation cabins, and trail corridors on the Kenai Peninsula as part of forest restoration treatments. Forest product volumes derived from these activities have been estimated and are included in Table 3-89.

In Prince William Sound and Copper River where recreation impacts are concentrated (such as campgrounds, near trailheads, or heavily used dispersed sites), some existing trees would be damaged by cutting, scarring, and soil compaction. Treatments within developed sites also include the removal of hazard trees. In these circumstances, individual dead and/or dying trees may be cut. These individual trees are so scattered and infrequent and their volume so minimal that the volume has not been estimated.

Some construction/reconstruction of campgrounds, trails, and trailheads is expected in each of the alternatives. Trees would be cut and cleared but only enough to allow safe construction and effective use of these facilities. The forest product volumes derived from these activities are minimal and have not been estimated.

Effects on forest products production from fire management.

Fire history on the Kenai Peninsula indicates that numerous small fires and infrequent large ones have occurred. Fire suppression is assumed to be the same under all alternatives.

Wildland fires during the first decade may create the need for additional salvage and/or sanitation cutting. Volume estimates associated with potential fire salvage/sanitation have not been made.

Effects on forest products production from insects and disease.

Under all alternatives, endemic insect and disease infestations would be allowed to run their course resulting in relatively small timber volume losses. Depending on the severity of the infestation, effects on timber resources could vary widely.

Under all alternatives, the potential exists for salvage/sanitation cuts to harvest dead, dying, or damaged timber, and to slow or impede infestations from spreading. The degree to which these harvests are undertaken will largely depend on the risk associated with infestation into healthy stands, public safety, the presence of high valued resources, and the resource emphasis of the infested or adjoining area. Salvage of dead trees is still expected under all alternatives from both suitable and unsuitable land bases and volume estimates are already incorporated in the timber program volume.

Effects on forest products production from wildlife management.

Under all alternatives, prescribed fire would be the primary tool on the Kenai Peninsula used to improve early successional habitat on forestlands that are unsuitable for timber production. While prescribed fire would reduce the amount of timber available for forest products in the short-term, most of the acreage that would be burned would not be road accessible for commercial, personal, or free use.

Some salvage/sanitation opportunities for forest products might be available in burn units pre-felled to establish fuel continuity or in thinning, pest suppression, or mechanical treatments. Volume estimates for forest products salvage/sanitation from wildlife treatments have not been made.

Cumulative Effects

The cumulative production of forest products that would result from a mix of management area prescription land allocations is displayed in Table 3-90.

Table 3-90: Timber sale program - decade 1.

Total Timber Sale Program	Unit of Measure	Alternative							
		No Action	Preferred	A	B	C	D	E	F
Total Demand for Commercial and Personal Use Timber	MMCF	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
	MMBF	24.6	24.6	24.6	24.6	24.6	24.6	24.6	24.6
Timber Sale Program									
Chargeable	MMCF	16.0	0.0	34.6	12.9	0.0	0.0	0.0	0.0
Non-chargeable	MMCF	6.3	4.3	7.3	6.3	4.3	3.1	2.5	2.3
Total	MMCF	22.3	4.3	41.9	19.2	4.3	3.1	2.5	2.3
Chargeable	MMBF	74.9	0.0	162.9	61.1	0.0	0.0	0.0	0.0
Non-chargeable	MMBF	22.1	15.1	27.1	25.1	17.1	10.0	8.0	7.0
Total	MMBF	97.0	15.1	190.0	86.2	17.1	10.0	8.0	7.0
Chargeable	Acres	3,700	0	7,710	2,920	0	0	0	0
Non-chargeable	Acres	6,010	3,750	7,590	7,120	4,260	3,550	2,600	2,350
Total	Acres	9,710	3,750	15,300	10,040	4,260	3,550	2,600	2,350

Alternatives A, No Action and B all provide sale quantities above the estimated combined demand for chargeable and nonchargeable forest products while

alternatives Preferred, C, D, E and F provide sale quantities below the combined demand. Alternative F provides the smallest sale quantity.

Table 3-91 displays the annual reforestation program on both suitable and unsuitable forestlands that would be necessary to ensure that acres harvested to provide chargeable and nonchargeable forest products are reforested. Natural regeneration is expected to successfully restock about 75 percent of the harvested acreage. Planting is anticipated on the other 25 percent.

Table 3-91: Annual reforestation.

Reforestation	Unit of Measure	Time Period	Alternative							
			No Action	Preferred	A	B	C	D	E	F
Natural Regeneration	Acres	Annual	728	281	1148	753	319	266	195	176
Artificial Regeneration	Acres	Annual	243	94	383	251	106	89	65	59
Total Reforestation	Acres	Annual	971	375	1531	1004	426	355	260	235

Effects on other lands within or adjacent to the Chugach National Forest

Private lands. About 16,440 acres of private land are scattered within the boundaries of the Forest. It is not known how much of this land has been affected by timber harvest or is planned for future timber harvest. The cumulative effect of past, present and future timber management activities is estimated to be minimal.

Native corporation lands. About 412,740 acres of Native corporation land are located within the boundaries of the Forest. During the last 15 years, several thousand acres of Native corporation land has been harvested. Most of this harvest occurred in eastern Prince William Sound, Montague Island and east of Cordova. One small parcel was harvested on the Kenai Peninsula. The cumulative acreage harvested to date is unknown. Under the *Exxon Valdez* oil spill restoration (EVOS) land acquisition program, some of the Native corporation land that was harvested or planned for harvest has either been purchased or the right to harvest the timber was purchased for oil spill restoration. Recently, the Chugach Alaska Corporation has been granted a permit to build a road across National Forest System lands to its Carbon Mountain land for the expressed purpose of harvesting an estimated 8,000 acres sometime in the future.

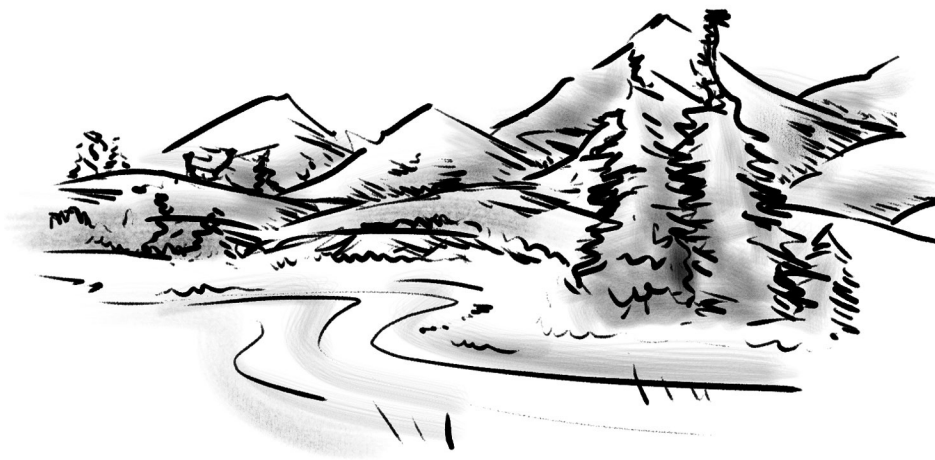
State lands. About 382,250 acres of state land is located within the boundaries of the Forest. Some state land surrounding the communities of Moose Pass, Hope, Cooper Landing, and Seward has been or is planned for re-conveyance to the Kenai Peninsula Borough for community development. The State of Alaska has conducted some salvage harvest of spruce beetle killed timber around the communities of Moose Pass and Cooper Landing in the past. The total acreage harvested in estimated to be less than 1,000 acres.

Federal lands. The Bureau of Land Management manages one small block of public land within the Forest boundary and the U.S. Fish and Wildlife Service and National Park Service manage public land adjacent to the Forest boundary. The

cumulative effect from past, present and future timber management activities administered by these three federal agencies is minimal.

The total acreage harvested within the Forest since 1974 amounts to less than one percent of the forest land on the Chugach National Forest. Most of this harvest has been salvage harvest on the Kenai Peninsula. Generally, salvage harvest has left residual overstory trees of hemlock, hardwoods and uninfested white spruce.

The cumulative effect on the Forest's forested plant communities from implementing any of the alternatives in the planning period is estimated to be minimal in respect to the range of natural variability. Planned timber harvest in the No Action Alternative and Alternatives A, and B would mostly influence the hemlock-Sitka spruce cover types in Prince William Sound and the Copper River and the white spruce cover type on the Kenai Peninsula. Planned harvest in the Preferred Alternative and in Alternatives C, D, E, and F would have a minimal effect on the white spruce cover type on the Kenai Peninsula.



Minerals

Introduction

Geologic, geophysical, and geochemical investigations along with surveys of known mines, prospects, and mineral occurrences have been conducted to evaluate the mineral resource potential of the Chugach National Forest. The U.S. Geological Survey and the U.S. Bureau of Mines conducted these studies. Information from these studies was used to describe the mineral potential. Identified and potential resources include gold, copper, zinc, silver, lead, coal, oil, and possibly manganese, molybdenum, nickel, chromium, barium, cobalt, tungsten, and antimony. Significant amounts of gold and copper were produced on the Forest, in the past. Oil has been produced from the Katalla/Controller Bay area of the Forest.

While significant mineral production, mainly copper, lode gold and placer gold, has taken place on the Chugach National Forest in the past, current activities are generally limited to seasonal and part-time placer gold mining as well as gravel and rock extraction. Lode gold is not currently being produced, however there is some small-scale exploration ongoing at several historic mines. Copper has been extracted in the past, but is not being mined at present. There was some limited exploration for copper deposits on the Forest during the early to mid-1970s (Jansons et al 1984). More recently, on private (native) lands within the Chugach National Forest, there has been some evaluation of copper and other deposits (Kodosky and Teller 1989, Chugach Alaska Corporation 1999b). Presently copper deposits are being promoted for joint venture options by the landowners.

Increased use of gravel resources on the Chugach will be linked primarily to road construction activities, such as reconstruction of the Seward and Copper River Highways. Increased use of rock resources will depend heavily on harbor construction or improvements. Increased activity in placer mining, as well as for other minerals, will depend, in part, on the price of gold rising. Recreational gold panning and suction dredging for placer gold is having an impact on a limited portion of the Forest at the present time. Much of this activity is done by instate visitors, although an increase in tourism might cause an increase in recreational gold panning.

The Forest Service considers mineral exploration and development to be important parts of its management program. It cooperates with the Department of the Interior in administering exploration and development. While the Forest Service is mainly involved with surface resource management and protection, it recognizes that mineral exploration and development are ordinarily in the public interest and can be compatible in the long term, if not immediately, with the purposes for which national forests were established. National Forest System lands are generally available for mineral exploration and mining unless specifically precluded by an act of Congress or other withdrawal.

Legal and Administrative Framework

Policy toward mineral activities on National Forest System lands is guided by statutes and expressed in statements by the President of the United States, the Secretary of Agriculture, and the Secretary of Interior.

- The **General Mining Law of 1872** allows exploration, development and production of minerals from mining claims located on public lands. The Forest Service policy for mineral resource management, to "foster and encourage private enterprise in the development of economically sound and stable industries, and in the orderly and economic development of domestic resources to help assure satisfaction of industrial, security, and environmental needs."
- The **Federal On-shore Oil and Gas Leasing Reform Act of 1987** gives the Forest Service authority to conduct a leasing analysis and decide which lands to authorize for leasing.
- **Alaska National Interest Lands Conservation Act of 1980 (ANILCA), Section 502** addresses mining and mineral leasing on certain national forest lands in Alaska. It withdrew the area of land known as the Copper River addition (approximately 801,600 acres) from location and entry under the General Mining Law of 1872. The "hardrock minerals" are available in the manner prescribed by Reorganization Plan Numbered 3 of 1946 and the Act of March 4, 1917.

Key Indicators

- Acres open to locatable mineral entry and mineral leasing
- Past and current mining claims
- Active mining operations
- Active mineral material sites
- Acres available for oil and gas leasing
- Reasonable foreseeable development for oil and gas production

Resource Protection Measures

Locatable Minerals

The locatable minerals regulations found at 36 CFR 228 Subpart A, requires the mining claimant to file a plan of operations (plan) or notice of intent (NOI) for proposed mining activities. The plan must include the name and address of operators, a sketch or map of the location, descriptions of operations, access, timing, operating period, and environmental protection measures. The Forest works with the operator to assure that standards and guidelines in the Revised Forest Plan are met. The plan requires an environmental analysis and decision before the plan is approved. A bond commensurate with the amount of

disturbance is generally required to guarantee reclamation work will be preformed. After plan approval, field monitoring is done to ensure compliance with the plan. Plans may be approved from one to five years. The length of time is mostly dependent on the scale of the operation.

Salable Minerals

The Forest Service regulations governing the disposal of saleable minerals (also called mineral material) are found in 36 CFR 228 Subpart C. These regulations require inclusion of reclamation measures in permits and contracts, except for disposals from common use or community pits. The Forest Service is responsible for reclamation of community sites and common-use areas. An environmental analysis and decision is required prior to offering a contract or permit. The operating plan must be responsive to the findings of the environmental analysis. Before operations begin under a permit or contract, a bond is generally required to ensure performance of payment and reclamation. Field monitoring is done to ensure compliance with the contract or permit.

Leasable Minerals

Leasing regulations are found at 36 CFR 228 Subpart E. The staged approach to oil and gas leasing, exploration, and development allows for analysis and mitigation of effects on other resources at each stage. The "leasing stage" level of analysis identifies effects on other resources from potential activities and specifies necessary restrictions (stipulations), if any, beyond those imposed by standard lease terms.

At the exploration and development stages, the Forest Service has the responsibility and authority to approve the Surface Use Plan of Operations (SUPO). Environmental analysis of the proposed project identifies effects on other resources from the proposed activity and specifies appropriate mitigation. Approved mitigation measures are included as conditions of approval. The Forest Service must approve the SUPO as part of the permit to drill (for which Bureau of Land Management (BLM) provides final approval of). Development activity proceeds only after the Forest Service and BLM have approved the development plan.

Forest Service and BLM personnel conduct periodic inspections of exploratory and development drilling operations and production activities to ensure compliance with mitigation measures and other applicable regulatory authorities.

Affected Environment

Statutory and regulatory direction separate mineral resources in lands owned by the United States into three broad categories: locatable (base and precious metals, such as gold, silver, and copper); leasable (oil, gas, and coal, as well as metallic minerals on acquired lands); and salable minerals or mineral materials (common variety sand, gravel, and stone).

Locatable Minerals

Locatable minerals are those mineral occurrences upon which mining claims can be located (mineral entry) under the General Mining Law of 1872, as amended. In general, the locatable minerals are those which are mined and processed for the recovery of metals, but may include certain nonmetallic minerals and uncommon varieties of mineral materials, such as valuable and distinctive deposits of limestone or silica.

On federally owned lands open to mineral entry, the public has the statutory right to explore for, locate mining claims and mine mineral deposits, subject to the U.S. mining laws. Through a memorandum of understanding with the BLM, the Forest Service administers most aspects of operation of U.S. mining laws on National Forest System lands.

Much of the Chugach National Forest System lands, approximately 4,601,800 acres, are open to entry under the General Mining Law of 1872. The mineral estate within the ANILCA Copper River addition (801,600 acres) to the Forest is withdrawn from operation of the mining laws, but is available under the hardrock or mineral leasing laws (ANILCA Sec. 502). Table 3-92 shows the status of the mineral estate on the Chugach National Forest.

Table 3-92: Status of the mineral estate within the Chugach National Forest boundary.

Mineral Estate Status	Acres
National Forest System Surface and Subsurface*	4,545,400
Acquired Lands	500
ANILCA Copper River Addition (acquired)	801,600
Katalla Oil Exchange Area	56,400
National Forest System Surface, Native Corporation Subsurface**	48,100
Private/State Surface and Subsurface	864,700
Total	6,316,700

* Includes 84,400 acres of fresh water lakes

** Includes EVOS lands

Past mineral production on the Forest has primarily been gold produced from placer and lode mines, as well as copper with associated base metals. The Analysis of the Management Situation (USDA Forest Service 1998b) contains published data regarding historic production and estimated reserves. Table 3-93 shows a summary of mineral production on the Chugach National Forest.

Table 3–93: Mineral production and reserves on the Chugach National Forest.

Deposit Type	Past Production	Current Production	Status	Reserves
Placer Gold	133,000 oz	Est. 700 oz/yr	Active suction-dredge operations	11,750,000 cubic yards ¹
Lode Gold	117,854 oz	0	Inactive	108,400 tons of ore ²
Base Metal (Copper)	208,667,556 lbs	0	Inactive	>7,246,000 tons ³
Coal	18,000 to 20,000 tons	0	Inactive	Est. varies from 36 million tons to >3.6 billion tons ⁴
Petroleum	153,922 barrels	0	Four lease applications pending	None identified, Low potential
Sand, Gravel, and Stone	Unknown	Unknown	Active	Very large

¹ estimated cubic yards of gold bearing gravel

² estimated tons of gold bearing ore

³ estimated tons of copper bearing ore, probably much larger with average grade of approximately 2% copper

⁴ largest percent occurs on private land

Source: Jansons et al. 1984.

Mineral Potential

The U.S. Geological Survey revised the overall Forest mineral resource potential in March 1999. Their report summarizes and builds on previous geologic and mineral studies. It outlines mineral resource tracts that contain both identified and undiscovered mineral resources. The criteria used were: 1) geochemical anomalies, 2) favorable geologic units, 3) presences of mines, prospects of mineral occurrences, and 4) geophysical anomalies. Four deposit types were considered in ranking mineral resource tracts: 1) Cyprus-type massive sulfide, 2) Chugach-type lode gold, 3) placer gold, and 4) polymetallic vein deposits. The ranking was restricted to those types because they have had historic source potential for the area. Other deposit types were not ranked because they occurred in only one area, were incompletely studied, or were considered to have a low potential. The mineral resource tracts are classed as follows:

Identified Mineral Resources - Most Favorable Mineral Potential. A mineral resource potential is high where nearly all conditions are favorable for mineral deposit formation. In these areas, geologic, geophysical, geochemical, and other data demonstrate or suggest a high probability of mineral deposits. The size, grade, and location of known deposits are important supporting data in the assessment.

Identified Mineral Resources - Moderately Favorable Potential. A mineral resource potential is moderate where favorable geologic conditions have been identified or may reasonably be interpreted to

occur, but where substantiating evidence for mineral deposits is less clearcut.

Undiscovered Mineral Resources - Highly Favorable Mineral Potential. Tracts considered highly favorable for containing as yet, undiscovered deposits.

Under-evaluated, Unevaluatable Mineral Potential. These areas are considered under-evaluated with respect to their mineral potential due to rugged topography and glacial cover.

Low Mineral Potential. These areas (undesignated) lack geologic criteria indicating potential for resources or contain resources not addressed in the report, or contain deposits having a low probability of future development activity.

The mineral resource tracts acres for the Forest are displayed in Table 3-94.

Table 3-94: Mineral resource tract acres and percent of the Chugach National Forest. ¹

Mineral Resource Potential Tracts	Acres	Percent
Most Favorable - Identified	298,000	5
Moderately Favorable - Identified	1,005,000	15
Highly Favorable - Undiscovered	1,434,000	23
Under-evaluated	1,216,000	19
Undesignated	2,336,700	37
Total	6,316,700	100

¹ Includes private, state, and Native corporation mineral estate.

Five percent of the Forest is considered most favorable for mineral development to occur, based on the presence of known deposits. Some 23 percent of the Forest does not contain known deposits, has been poorly explored (due to rugged terrain and remoteness), and yet the geology is favorable for mineral deposits. These areas are considered highly favorable for the discovery of new deposits. Some 19 percent of the Forest is considered unevaluated and unevaluatable primarily because of the glacial cover as well as rugged terrain and remoteness. Lastly, 37 percent of the lands are classified as having a low potential for mineral occurrence. They lack geologic criteria indicating potential for resources or contain resources not addressed in the report, or contain deposits having a low probability of future development activity.

Current Situation

Recently (1994-1998) there were some 70 to 90 active plans of operations on the Forest. Most of those are for placer gold operations, with a few being lode gold exploration. The operations are generally active during the 3 to 4 month summer mining season. There are no plans of operations for copper or massive sulfides, on the Forest. The active operations are primarily small scale suction dredging. Some are hand placer operations using a shovel and sluice. Placer operations are producing less than 700 ounces/year. Nearly all of the active mining operations are occurring on the Kenai Peninsula primarily along the road corridor and on historically mined streams.

Potential Foreseeable Development

According to "Assessment of mineral resource tracts in the Chugach National Forest, by Nelson and Miller (under USGS contract) 2000:

"Any production from either the inferred reserves or from as yet undiscovered deposits will be strongly dependent on metal values rising. Current feasibility evaluations suggest that production is unlikely for any of the lode deposits at current prices. Placer gold production, on a small scale is likely to continue in the more easily assessable areas that have had a previous history of placer activity."

Leasable Minerals

Federally owned leasable minerals include oil and gas, and coal. Metallic minerals on acquired lands and the Copper River addition (ANILCA, Sec. 502) are also leasable. These minerals are subject to exploration and development under leases, permits, or licenses granted by the Secretary of the Interior. The principal statutes are the Mineral Lands Leasing Act of 1920 as amended, the President's Reorganization Plan No. 3 of 1946, the Mineral Leasing Act for Acquired Lands of 1947, the Federal Coal Leasing Amendments Act of 1975, the Surface Mining Control and Reclamation Act of 1977, National Materials and Mineral Policy, Research and Development Act of 1980, and the Federal On-shore Oil and Gas Leasing Reform Act of 1987. The Secretary of the Interior's authority is administered by the BLM. When National Forest System lands are involved, the Forest Service has the authority and responsibility to determine which lands are available for leasing. The Forest Service is also responsible for prescribing lease terms that provide protection of the surface resources and values. The Secretary of the Interior has the authority to administer operations on National Forest System lands leased, licensed, or permitted. The Office of Surface Mining is responsible for coal, and the BLM is responsible for other minerals.

Potential for "Hardrock" Leasable Minerals

ANILCA (Copper River addition Sec. 502). Subject to valid existing rights, the minerals in public lands within the Copper River addition (approximately 801,600 acres) to the Chugach National Forest, are withdrawn from location, entry, and patent under the United States mining laws. With respect to such areas, the Secretary of Agriculture, under such reasonable regulations as deemed appropriate, may permit the removal of nonleasable minerals from the lands in the manner prescribed by Reorganization Plan Numbered 3 of 1946 and the Act of March 4, 1917 (39 Stat. 1150; 16 U.S.C. 520), and the removal of leasable minerals from such lands in accordance with the mineral leasing laws, if the Secretary finds that such disposition would not have significant adverse effects on the administration of the area.

The Act of March 4, 1917 (39 Stat. 1150; 16 U.S.C. 520) The Secretary of Agriculture is authorized to permit the prospecting, development, utilization of the mineral resources of the lands acquired under the Act of March 1, 1911.

Reorganization Plan Numbered 3 of 1946. The functions of the Secretary of Agriculture and Department of Agriculture with respect to the uses of mineral deposits in certain lands pursuant to the provisions of the Act of March 4, 1917, (39 Stat. 1134, 1150; 16 U.S.C. 520) "...are hereby transferred to the Secretary of the Interior and shall be performed by him or, subject to his direction and control, by such officers and agencies of the Department of the Interior as he may designate: Provided, that mineral development on such lands shall be authorized by the Secretary of the Interior only when he is advised by the Secretary of Agriculture that such development will not interfere with the primary purposes for which the land was acquired and only in accordance with such conditions as may be specified by the Secretary of Agriculture in order to protect such purposes."

Primary Purpose for Management (ANILCA Sec. 501(b)) The primary purpose of management for the Copper/Rude River addition and the Copper River-Bering River portion of the Chugach National Forest is the conservation of fish and wildlife and their habitat. The removal of nonleasable minerals may be permitted if the Secretary finds that such disposition would not have significant adverse effects on the administration of the area.

Current Situation

There are 298,000 acres of most favorable, 1,434,000 acres of undiscovered highly favorable mineral potential, 1,216,000 acres of under evaluated, unevaluatable mineral potential and 2,336,700 acres of low mineral potential. There are no current plans of operations and have been no application on record.

Potential Foreseeable Development

According to "Assessment of mineral resource tracts in the Chugach National Forest (Nelson and Miller 2000):

"Any production from either the inferred reserves or from as yet undiscovered deposits will be strongly dependent on metal values rising. Current feasibility evaluations suggest that production is unlikely for any of the lode deposits at current prices. Placer gold production, on a small scale is likely to continue in the more easily assessable areas that have had a previous history of placer activity."

Potential for Oil and Gas

Most of the Forest (97.5 percent) has no potential for oil and gas (Bruns 1996, Plafker 1987). These areas do not need to be analyzed further or made available for leasing.

The Gulf of Alaska Tertiary Province was identified as a possible petroleum province (Miller et al. 1959). It borders the Gulf of Alaska from the Copper River Delta 300 miles southeastward to Icy Point and extends inland 2 to 40 miles to the southern front of the Chugach and St. Elias Mountains. The principle published sources of geologic information are reports on the Katalla (on the Forest) and the Yakataga (outside the Forest) Districts.

The USGS rates approximately 160,000 acres of an area, within the Gulf of Alaska Tertiary Province, on the East Copper River Delta (and including Katalla area) as having low potential for oil and gas. The presence of any major fields is unlikely because of the complex structure and the lack of suitable reservoir rocks (Nelson and Jansons 1984).

In the Katalla area, numerous oil and gas seeps onshore led to the discovery and development of the Katalla oil field. During a 30-year period, from 1904 to 1933, the Katalla field produced about 154,000 barrels from 18 wells in an area of about 60 acres. Production and refining operations provided products for local use.

Forty-four wells were drilled in the Katalla area, and another 23 wells were drilled along the coastal plain of the Gulf of Alaska, for a total of 67 onshore wells drilled in the Gulf of Alaska Tertiary Province. Except for the 18 producing wells in the Katalla field, none of the wells encountered producible hydrocarbons.

Three federal offshore lease sales have been held in the past in the Gulf of Alaska. Sale no. 39 was held in 1976, sale no. 55 was held in 1980 and a reoffering sale, RS-1, was held in 1981. Fourteen wells have been drilled offshore between 1969 and 1983. No producible hydrocarbons were discovered in any of these exploratory wells (Risley et al. 1992).

The offshore component of the Gulf of Alaska Tertiary Province appeared on the last 5-year plan (lease sale no. 158) of Minerals Management Service (MMS) but was never leased. It was dropped from the current 5-year plan (lease sale no. 179) due to lack of industry interest. Lease sale 179 (previously no. 158) was deferred to the next 5-year plan in 2000.

One hundred and sixty-four lease offers have been made for leases in the Eastern Copper River delta, and by 1987 all were closed. The Secretary of the Interior rejected all lease offers for leases inside the Favorable Petroleum Geological Province (FPGP) because Section 1008 of ANILCA provides that areas within the FPGP may only be leased through competitive bidding. The FPGP area is the same area as the Gulf of Alaska Tertiary Province. There were 48 offers for leases outside the FPGP in 1987. All have been withdrawn except for four, which have been pending since 1969. The BLM has attempted to locate the remaining applicants to request if they would like to withdraw their application and receive a refund, but has been unable to do so. The Forest does not consider the four remaining lease offers to constitute an expression of interest, since none of these lease applicants can be located. Additionally, all four offers are within an area of no potential for oil and gas. However, in order to resolve these pending applications the Forest must make a decision of whether or not the lands are availability for leasing.

Special Areas

The 1982 Chugach Native Inc. (CNI) Settlement Agreement gave the CNI (now the Chugach Alaska Corporation) rights to oil and gas in the "Katalla area," and an exchange preference for oil and gas rights in the "Katalla Exchange" area.

In the “Katalla area,” the settlement agreement gave CNI the exclusive right to drill for, extract, remove and dispose of all oil and gas deposits, as well as the right to construct all facilities and structures necessary to the full enjoyment thereof, for a period ending on December 31, 2004, and so long thereafter as oil and gas is produced in paying quantities. The United States reserves all other minerals. In addition, the United States reserves all authorities to regulate and prohibit any particular surface occupancies within the Katalla area, and permit public access where that use does not interfere with the rights of CNI. All operations by CNI must be conducted under a plan of operations approved by the United States and a special use permit (no fee) is required for entry for conducting oil and gas operations.

The “Katalla Exchange” area provisions are available to CNI for 25 years from the date of the agreement, and expire in 2008. In the event the Secretary makes a decision that the Katalla Exchange area should be made available for oil and gas production through the issuance of leases, then CNI shall have the first opportunity to acquire, by exchange, the rights to the oil and gas. An exchange may include interests in land greater than the oil and gas estate, including fee title. However, the United States is not obligated to open all or part of the Katalla Exchange area. From the time of notification of lease availability to CNI, then CNI shall have up to two years to negotiate and execute an exchange agreement, but that time shall not exceed 2008.

Current Situation

There have been no lease requests since 1987. Some seismic work has been done in recent years in the Katalla area. There are currently no producing wells on the Forest and no active leases. There are four lease applications pending (since 1969). When the Forest makes a decision on whether the lands are available for leasing, BLM can then resolve the lease applications. The interest in oil and gas on the Forest is considered low. At this time there is a proposal to drill on private lands in the Katalla area and future plans to drill directionally into the “Katalla Exchange” area.

Potential for Coal

Extensive coal deposits, known since 1896, occur in rocks in the Bering River area on the east side of the Forest. The area is classified as one of substantiated coal resource potential. Coal bearing rocks of the Kushtaka formation underlie about 10,000 acres of the Chugach National Forest and about 27,000 acres of Chugach Alaska Corporation lands. Only a minor amount of coal has been produced (18,000 - 20,000 tons), probably between 1910 and 1920.

A USGS report, “A Review of the Geology and Coal Resources of the Bering River Coal Field” (Barnes 1951), concluded that a large proportion of the coal exposures examined have been greatly disturbed, either by complex faulting or by crushing and shearing resulting from structural deformation. Since these conditions are typical of all parts of the field studied, the prospect of proving a large reserve tonnage of economically minable coal in a single block is not encouraging.

Areas of the Forest determined to be suitable for coal development would require site and project-specific environmental analysis prior to leasing and exploratory activity. Mitigation measures for protection of other resources and forest uses would be analyzed and specified at such time as a lease request is made.

Current Situation

There are no active coal mines or leases on the Forest. No coal production is occurring on the private lands in the Bering River Coal Fields. There is currently no development interest in the coal deposits.

Potential Foreseeable Development

Given the facts stated above concerning the oil and gas potential and the level of interest, it is unlikely that the Forest will see any significant oil and gas leasable activity in the near future. Likewise, development of coal resources seems unlikely. Coal has been known for many years, but has not been successfully mined to date. It is possible, if the road is built accessing the Bering River coalfields, that the discontinuous coal seams might be produced.

Salable Minerals

Salable minerals, also known as mineral materials or common variety minerals, are generally low-value deposits of sand, gravel, and stone that are used for building materials, erosion control, and road surfacing. Salable minerals are generally sold by competitive sale to the highest bidder. Community pits provide small sales to individuals, at a set price. Free use may be available to nonprofit associations, individuals, or government entities for use in public projects.

Extraction of these materials from National Forest System lands is at the discretion of the Forest Service. The major controlling statutes are the Mineral Materials Act of 1947 and Surface Resources Act of 1955. Requirements controlling mineral material operations are similar to those for leasable minerals.

There are two major areas of interest for mineral materials: the Kenai Peninsula/Seward Highway and the Cordova/Copper River Highway. Additionally the Forest has a rock and gravel source along the Alaska Railroad, Seward/Anchorage line, on the Kenai Peninsula. Prince William Sound area has tremendous potential for rock sources, although much of the area is a designated Wilderness Study Area.

In 1996, under an interagency agreement, a Mineral Materials survey was conducted by BLM along the Seward Highway road corridor. Twenty-seven sites were examined, consisting of current and previous materials pits as well as potential new sources. The report concluded that a majority of existing pits have been depleted or cannot be further expanded due to visual impacts or potential conflicts with other users. The quality of the mineral material available is generally low. Several existing pits can be expanded and there are new localities which hold potential for future development, particularly for borrow material. Several of the better material pits along the highway, were included in state land selections and have passed out of National Forest System ownership. This situation has prompted the investigation for new sources, as well as a careful

review when a request from the State Department of Transportation is made for mineral materials in the area. Free use permits may not be granted when the authorized officer determines the applicant owns or controls an adequate supply of mineral materials in the area of demand.

Current Situation

The Forest currently has four active community material pits, two (one for sand, and one for gravel) on the Seward District, one (gravel) on the Glacier District, and one (sand) on the Cordova District. There are two community rock sources on the Seward District. Currently about 30 materials permits are issued each year. Material is also used by the Forest Service for various projects, such as campgrounds, Forest roads, and trails.

The Spencer Glacier rock quarry was under permit from 1978 to 1997. It is ideally situated along the railroad and there is a demonstrated demand for the rock produced there. The rock is suitable for riprap for road and harbor projects. The quarry is currently not in operation because there is a mining claim issue to be resolved prior to offering the site for competitive bid.

All lands on the Chugach National Forest are open for permit application for salable minerals, with the exception of the Nellie Juan-College Fiord Wilderness Study Area and certain small withdrawn areas. Approval of permits is discretionary.

Potential Foreseeable Development

Mineral materials are expected to remain in demand and the Forest should be able to supply these materials as required for road construction and local uses. This may involve the opening and use of new pit sites. It is expected that the Spencer quarry will be back into production in the near future, again supplying rock for marine and road projects. The Copper River Delta sand source along the Copper River Highway can supply the local need for many years.

Environmental Consequences

General Effects – Locatable Minerals

The Revised Forest Plan does not affect the quantity or quality of locatable minerals, but it will affect the number of acres where mineral exploration and development are allowed. One of the most significant effects to locatable and “hardrock” leasable minerals operations is the withdrawal of lands from all forms of mineral entry. All withdrawals however, are subject to valid existing rights.

When a Record of Decision is issued for the selected alternative, the Forest Service may request that the BLM withdraw certain management areas from all forms of mineral entry. Some management areas will be withdrawn upon designation. The areas recommended for withdrawal and those that may be withdrawn upon designation are as follows:

131 - Recommended Wilderness

132 – Recommended Wild River

- 141 – Proposed Research Natural Area
- 142 - Natural Processes
- 241 - Municipal Watershed
- 341 - Developed Recreation Complex – Reduced Noise
- 441 - Developed Recreation Complex
- 522 - Transportation/Utility Systems

Additionally, developed campgrounds or other facilities may be withdrawn.

Currently within the Forest, there are lands that are not subject to the 1872 Mining Law as amended (Mining Law). These lands include *Exxon Valdez* oil spill (EVOS) lands, and the Copper River addition (CRA), as well as some small parcels. The lands not subject to the Mining Law involve 923,830 acres, which is 16.8 percent of the Chugach National Forest. The status of these lands does not vary by alternative. The CRA as well as several smaller acquired lands parcels, while not subject to the Mining Law, are subject to “hardrock” (gold, silver, copper etc.) leasing. This is explained in the “Leasable Minerals” section. The EVOS lands have generally had the mineral estate severed, and the Forest Service has only the surface estate; the subsurface estate is privately owned.

Table 3-95 displays, by alternative, the acreages in areas of different mineral potential (as identified in USGS Open-File Report 00-026, Nelson and Miller, 2000) that would be recommended for withdrawal. Table 3-95 also displays, by alternative, acreages of lands open to mineral entry.

The Preferred Alternative recommends about 30.4 percent of the Forest for withdrawal from all forms of mineral entry. Most of the recommended lands are not within the most favorable mineral resource tracts.

The least amount of land to be withdrawn is in Alternative A, where only .2 percent would either be recommended for withdrawal or withdrawn upon designation. The most land proposed for withdrawal would be in Alternative F at 80.9 percent. The current situation is 30.4 percent recommended for withdrawal.

There is a total of 298,000 acres of “most favorable” tracts for identified mineral resources. It is within these tracts that nearly all of the current level of mineral activity is taking place. The most restrictive alternative (F) would recommend 101,820 acres for withdrawal, leaving nearly 2/3 of the area open for mineral development.

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Table 3-95: “Hardrock” minerals recommended for withdrawal and lands open to mineral entry.

Mineral Potential	Alternative					
	No Action	Preferred	A	B	C	F
IR ¹ – Most Favorable	16,800	19,210	1,280	11,720	11,720	101,820
IR – Moderately Favorable	107,860	155,600	2,150	80,960	115,030	498,270
UR ² – Most Favorable	348,420	339,260	140	122,780	241,310	940,830
UER-UE ³	755,950	986,720	100	524,460	370,020	1,149,630
Low Potential	439,960	396,880	5,720	152,830	319,020	1,754,650
Total Acreage Recommended for withdrawal⁴	1,668,990	1,897,670	9,390	892,750	1,057,100	4,445,200
Percent recommended withdrawn	30.4%	34.6%	0.2%	16.3%	19.2%	80.9%
Total Acreage Open	3,822,590	3,593,910	5,482,190	4,598,830	4,434,480	1,046,380
Percent Open	69.6%	65.4%	99.8%	83.7%	80.8%	19.1%

¹ IR = identified resources

² UR = undiscovered resources

³ UER-UE = under-evaluated, un-evaluable

⁴ Includes lands that would be withdrawn upon designation (i.e. Wilderness, Wild River, etc.)

Table 3-96 shows by percent, the availability in each alternative, of the most favorable identified mineral resource tracts and the highly favorable undiscovered mineral resource tracts. Mineral development is most likely to take place in the “most favorable, identified resources” tracts. Any new discoveries are most likely to be made in the “highly favorable, undiscovered resources” tracts. The mineral industry has indicated that those two tract types are the most significant.

Table 3-96: Percent available of most favorable resource tracts.

Mineral Resource Tracts	Alternative							
	No Action	Preferred	A	B	C	D	E	F
Most Favorable, identified resources	94	93	100	96	96	85	70	66
Highly favorable, undiscovered resources	76	76	100	91	83	93	69	34

Direct and Indirect Effects

Management of other resources does not have any direct effects on physical mineral resources. Indirectly, development of public or private capital improvements could require localized withdrawals, but they would be minor in scope.

Cumulative Effects

An abandoned and inactive mine hazard inventory was done on the Forest from 1991 through 1994. There are a series of reports available at the Supervisor and Regional offices documenting the findings. Some 137 sites were field visited. Most of the hazards present are physical hazards; some chemical hazards exist. Nearly all of these sites were contaminated prior to the promulgation of Forest Service mining regulations (36 CFR 228). The Forest has begun the mitigation of these sites. Current regulations generally prevent new HAZMAT sites by required submission of an operating plan, reclamation and bonding requirements, and follow-up site monitoring.

A three-year study (1988-1990) was done to monitor what, if any, cumulative water quality impacts were occurring on the Forest streams from placer mining operations (Huber and Blanchet 1992). The results from water quality sampling did not indicate significant cumulative effects from placer mining operations. There is currently less active placer mining than was occurring during the study period. A new study will be initiated if the level of placer mining increases beyond that of the earlier study.

Locatable minerals activity is expected to continue in the same intensity as the past 10 years. Small-scale suction dredging occurring in the active stream channel, given timing restrictions for anadromous fish streams, is not expected to have any cumulative effects. Past water quality studies conducted on the Forest have determined that there are no cumulative effects to water quality from the small number, low frequency, and small scale of the suction dredging operations that occurs.

General Effects – Leasable Minerals

Oil and Gas – Geographic Zones 1 - 4

Alternatives in this EIS allocate certain lands, designated as Zones 1, 2, and 3 as available or unavailable, for oil and gas exploration and development. These three zones comprise 186,130 acres, which is three percent of the Forest, and overlies the Copper River - Bering River portion of the Forest. ANILCA, Title V mandates managing this area for the conservation of fish and wildlife and their habitat. Mineral leasing is allowed in so far as it does not have significant adverse effects on the administration of the area.

Zones 1, 2 and 3 were analyzed during this Forest planning effort. The environmental consequences are displayed within this EIS. Standard stipulations and site specific special stipulations as required would apply to oil and gas leases as well as the exercising by Chugach Alaska Corporation (CAC) of their Katalla Area oil and gas rights (1982 CNI Settlement Agreement). Zone 4 (5,315,320 acres) includes the remainder of the Forest and was determined to have no potential for oil and gas production (Plafker et al. 1978). Applications for oil and gas leases in Zone 4 would not be accepted without specific on-site environmental analysis.

Geographic Zone 1

The Katalla area (Zone 1) oil and gas rights as defined in the 1982 CNI Settlement Agreement is an area where CAC possesses a term interest in the oil and gas estate under specific conditions. In Zone 1, oil and gas could be developed under all alternatives, under conditions of the 1982 CNI Settlement Agreement. Zone 1 would not be subject to leasing to the public, but the process for the oil and gas development would be similar to a leasing situation. Upon expiration of CAC's oil and gas rights, the area would be managed according to the underlying prescription, and would be available for leasing in Alternatives A, B, and C; unavailable in the Preferred Alternative, and Alternatives D, E, and F. The 1984 Forest Plan (No Action Alternative) did not address this issue because it predated the Federal Onshore Oil and Gas Leasing Reform Act of 1987. In addition, there has been no expression of interest. The area has always been available as defined in the CNI Settlement Agreement.

Geographic Zone 2

The Katalla exchange area (Zone 2) as defined in the 1982 CNI Settlement Agreement, is subject to Chugach Alaska Corporation's exchange preference right. The exchange preference right is subject to expiration. Oil and gas development in Zone 2 will be implemented in accordance with the CNI Settlement Agreement, 1982. The 1984 Forest Plan (No Action Alternative) did not address this issue because it predated the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Geographic Zone 3

Zone 3 is an area identified as having low potential for oil and gas production and located outside of Zones 1 and 2. Zone 3 would be available for leasing under Alternatives A, B, and C and unavailable in the Preferred Alternative and

Alternatives D, E, and F. Table 3-97 displays the total acres available for oil and gas leasing by alternative. Zone 4 acreage is the same for all alternatives, because the area has no potential for oil and gas. The 1984 Forest Plan (No Action Alternative) did not address this issue because it predated the Federal Onshore Oil and Gas Leasing Reform Act of 1987.

Table 3-97: Zones available for oil and gas leasing and their total acreage.

	Alternatives							
	No Action	Preferred	A	B	C	D	E	F
Zone 1 (10,680 acres)	NA ¹	CAC only ²	CAC only ³	CAC only ³	CAC only ³	CAC only ²	CAC only ²	CAC only ²
Zone 2 (56,360 acres)	NA ¹	Yes ⁴	Yes	Yes	Yes	No	No	No
Zone 3 (119,090 acres)	NA ¹	No	Yes	Yes	Yes	No	No	No
Total acreage available, includes CAC oil & gas rights	NA¹	67,040	186,130	186,130	186,130	10,680⁵	10,680⁵	10,680⁵
Area of potential/interest (Zones 1-3, acreage)	186,130	186,130	186,130	186,130	186,130	186,130	186,130	186,130
% potential/interest areas available	NA ¹	36%	100%	100%	100%	6% ⁶	6% ⁶	6% ⁶

¹ The 1984 Forest Plan (No Action Alternative) did not address the issue because it predated the 1987 Oil and Gas Leasing Reform Act.

² The answer is "no" upon expiration of CAC's oil and gas rights.

³ The answer is "yes" upon expiration of CAC's oil and gas rights.

⁴ Oil and gas development in Zone 2 will be implemented in accordance with the CNI Settlement Agreement, 1982.

⁵ Upon expiration of CAC's oil and gas rights, there would be zero acres available.

⁶ Upon expiration of CAC's oil and gas rights, there would be zero percent available.

The reasonably foreseeable development for Zones 1, 2, and 3 was determined to be one exploration well, somewhere in one of the three zones within the next 10 years.

Stipulations were developed by an interdisciplinary team to protect areas that would not be adequately protected by the standard lease agreement. The stipulations are:

NSO – Available for oil/gas leasing with no surface occupancy;

CSU - Available for oil/gas leasing with controlled surface use;

CSU/TS - Available for oil/gas leasing with controlled surface use and timing restrictions;

TS - Available for oil/gas leasing with timing restrictions; and,

SS - Available for oil/gas leasing with standard stipulations.

Revised Forest Plan, Appendix I - Oil and Gas Leasing Stipulations, explains the justification and methodology of utilizing these stipulations.

For Zones 1-3, the leasing analysis in the Revised Plan process has met the requirements for a leasing analysis found in 36 CFR 228.102(c). Oil and gas

leasing supplemental stipulations have been identified and mapped on site-specific basis to a 40-acre level of accuracy. No new stipulations have been used.

Two leasing decisions are made in the Revised Forest Plan: the lands administratively available for leasing and the leasing decision for specific lands, 36 CFR 228.102(e) (subject to the verification process defined in the regulations).

Oil and gas leasing regulations 36 CFR 228.102(c)(2) require one of the alternatives analyzed to be that of not allowing leasing. The no leasing alternative for Zones 1 – 3 is reflected in Alternatives D, E, and F. However, Zone 1 would be subject to CAC's oil and gas rights until such time as these rights expire.

Oil and gas stipulations for the Preferred Alternative and Alternatives A – F were generated using a two-step process. The leasing stipulation was first identified based on protection of other resources. The leasing stipulation was then adjusted to reflect the standards of the management area prescription allocation for each alternative.

Table 3-98 displays the acres (and miles of stream fish habitat) by stipulation for Zones 1-3 for each alternative. The table addresses requirements in: regulations found at 36 CFR 228.102(1)(i) which directs identifying areas open to leasing subject to standard lease terms and 36 CFR 228.102(1)(ii) which directs that the leasing analysis indicate lands open to development but subject to constraints that will require the use of lease stipulations such as those prohibiting surface use on areas larger than 40 acres. Maps are available in the planning record, located at the Forest Supervisor's Office, in Anchorage, Alaska.

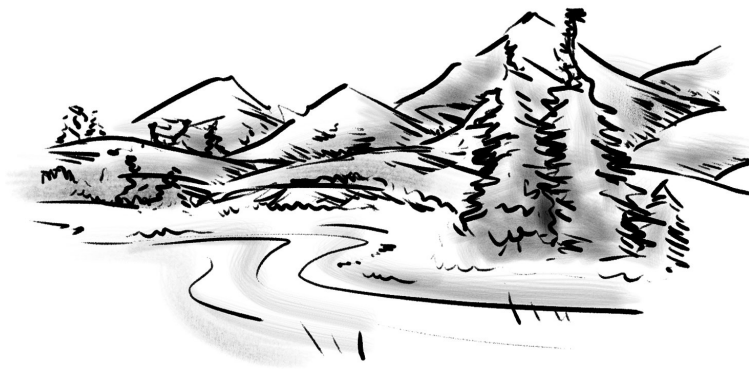


Table 3-98: Oil and gas leasing stipulations for Zones 1 - 3 (units in acres or miles).

	Alternative							
	No Action	Preferred	A	B	C	D	E	F
Availability	NA ¹	Zones 1,2	Zones 1,2,3	Zones 1,2,3	Zones 1,2,3	Zone 1	Zone 1	Zone 1
Standard Terms (all available acres)	NA ¹	67,040 ¹	186,130	186,130	186,130	10,680 ²	10,680 ²	10,680 ²
NSO - Wild & Scenic Rivers	NA ¹	5,780	18,790	18,790	18,790	760	760	760
NSO – Soils/Slope	NA ¹	0	7,600	7,600	7,600	0	0	0
CSU – Soils/Slope	NA ¹	66,700	167,100	167,100	167,100	10,680	10,680	10,680
CSU (BMPs) – Fish ³ (miles of stream)	NA ¹	41.5	113.9	113.9	113.9	3.7	3.7	3.7
CSU/timing – Wildlife ³	NA ¹	134,700	403,600	403,600	403,600	17,500	17,500	17,500
Timing – Wildlife ⁴	NA ¹	111,700	361,500	361,500	361,500	17,200	17,200	17,200

¹ The 1984 Forest Plan (No Action Alternative) did not address the issue because it predated the 1987 Oil and Gas Leasing Reform Act.

² If CAC's oil and gas rights (and under the Preferred, exchange preference right) expire then the figure would be 0, because the lands would not be available.

³ This is the only category that uses miles rather than acres.

⁴ Acres may exceed total available because acres were totaled by species and there is overlap.

Preferred Alternative Zones 1 – 2 are available for oil and gas development under the 1982 CNI Settlement Agreement. Zone 3 is not available for oil and gas development.

No Action Alternative Zone 1 could be developed for oil and gas under the 1982 CNI Settlement Agreement. A site-specific environmental analysis would be conducted and stipulations developed, in response to an operating plan submittal. No leasing availability decision was made in the 1984 Forest Plan because it predated the 1987 Federal Onshore Oil and Gas Leasing Reform Act. Leasing could have occurred on a case-by-case basis following site-specific analysis.

Alternatives A – C Zones 1 – 3 are available for oil and gas development (leasing on Zones 2-3). Zone 1 is available for oil and gas development and would be available for leasing upon expiration of CAC's oil and gas rights.

Alternatives D – F Zones 1 – 3 are not available for leasing. However Oil and gas in Zone 1 may be developed under the terms of the 1982 CNI Settlement Agreement, until such time as CAC's oil and gas rights expire. The oil and gas rights would be valid existing rights within Recommended Wilderness.

The stipulations (Revised Forest Plan, Appendix I) would be the same for all alternatives, which allow leasing. An exception is for oil and gas development in Alternatives D, E, F, which all place Recommended Wilderness over Zone 1. CSU stipulations would apply to the entire area of Zone 1, in order to protect the wilderness character, while still allowing oil and gas development.

No Surface Occupancy (NSO) is the most restrictive lease stipulation. NSO would apply to:

- eligible/recommended wild river corridors;
- eligible/recommended scenic river corridors;
- glaciers and ice fields; and,
- slopes over 75 percent.

Because Zones 1-3 have a low potential for oil and gas development, any environmental effects would be small given the low level of expected activity.

Oil and Gas – Geographic Zone 4

The remainder of the Forest, geographic Zone 4, has no potential for oil and gas. Leasing may occur on a case-by-case basis following site-specific analysis. Some of these lands are not subject to mineral leasing, such as campgrounds and the Wilderness Study Area.

“Hardrock” Leasables

“Hardrock” (gold, silver, copper, etc.) minerals, normally termed locatable minerals, become leasable on certain acquired lands. The Copper River addition (CRA), comprised of 801,600 acres, is a large parcel of acquired status land that although not subject to the U.S. Mining Laws, may make available the “hardrock” minerals through the leasing process. The CRA west of the Copper River lies within an area that has been identified as having a high potential for undiscovered resources. The CRA, east of the Copper River, lies within an area that has been determined to be under-evaluated and not evaluable for mineral resources due to glaciers, ice fields and rugged topography. ANILCA Title V mandates that CRA be managed primarily for the conservation of fish and wildlife and their habitat. Mineral leasing of (normally) non-leasable minerals (hardrock minerals) may be permitted if the Secretary determines that such disposition would not have significant adverse effects on the administration of the area.

If a proposal to lease land within the CRA is submitted, a site-specific environmental analysis would be done to determine environmental effects from the proposed activity, and identify mitigation measures. The Forest Service would then prepare a decision document identifying the Forest Service position, either denial or consent.

The No Action Alternative and Alternatives A and B permit hardrock leasing in the CRA to the extent that such disposition would not have significant adverse effects on the administration of the area.

The Preferred Alternative, and Alternatives C, D, E, and F, place Recommended Wilderness over the portion of the CRA that lies east of the Copper River. The development of hardrock minerals would not be allowed. The eastern portion of the CRA has been determined to be of limited value for mineral development because of the glaciers, ice fields and rugged topography. Lands in the western portion of the CRA would be subject to hardrock leasing to the extent that such disposition would not have significant adverse effects on the administration of the

area. Lands west of the Copper River are considered to be favorable for undiscovered mineral resources.

Alternatives E and F place Recommended Wilderness over all CRA lands. The development of hardrock minerals would not be allowed. Lands west of the Copper River are considered to be favorable for undiscovered mineral resources. Lands east of the Copper River have been determined to be of limited value for mineral development because of the glaciers, ice fields and rugged topography.

Given the remoteness, lack of access, lack of known deposits, and the lack of any proposed mineral activity in the area over the last 10 years, it is unlikely that any leases will be applied for within the next 10 years, therefore no environmental effects would be expected to occur from hardrock leasing.

Cumulative Effects

Oil and gas leases have numerous environmental requirements to comply with applicable law and regulations. To minimize effects to other resources, lease stipulations are applied to oil and gas development. The lease stipulations are described in Appendix I of the Revised Forest Plan. When leasing restrictions are combined, oil and gas development is adversely affected. Under no surface occupancy restrictions, drilling cost would increase because of directional drilling requirements. Seasonal restrictions under timing stipulations could result in access time being too short for effective exploration and development programs. Controlled surface use stipulations also could increase the cost of exploration and drilling. The cumulative effect of lease restrictions could hinder or prevent oil and gas development in certain locations within the Forest.

General Effects – Mineral Materials

Common variety minerals may be sold for fair market value or disposed of through free use in any of the proposed alternatives. This category of minerals is widely available across the Forest. Some prescriptions would not allow the extraction of mineral materials. None of the alternatives would result in significantly affecting the supply since there are large volumes of common variety minerals on private and state lands that could meet the public needs.

One important source of riprap and armor stone on the Forest, the 600-acre Spencer Glacier Mineral Materials Site, would be available under all alternatives. This source is significant because of its location along the railroad, large volume of material available, being a developed quarry, and containing a type of material that is in demand. The Spencer Glacier site lands were withdrawn from mineral entry under the U.S. Mining Law, for the specific purpose of a mineral materials source. In the Preferred Alternative and Alternatives C and D, there could be a developed recreational complex (about 50 acres) at Spencer Glacier. Although the complex and quarry could co-exist side-by-side physically, there would likely be conflicts because the quarry would be considered to be a visual impact to the glacier scene and the natural quiet would be disrupted in the vicinity by blasting and heavy equipment operating at the quarry.